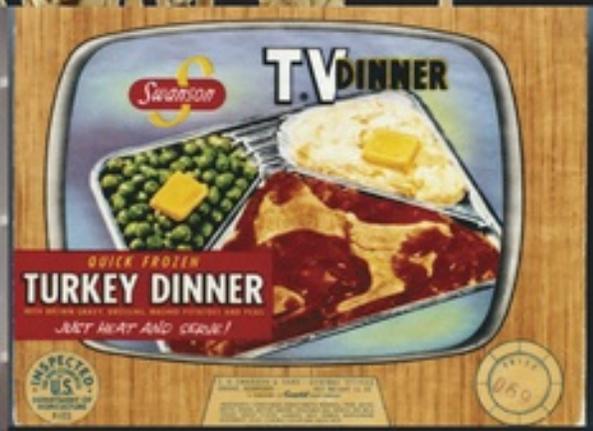
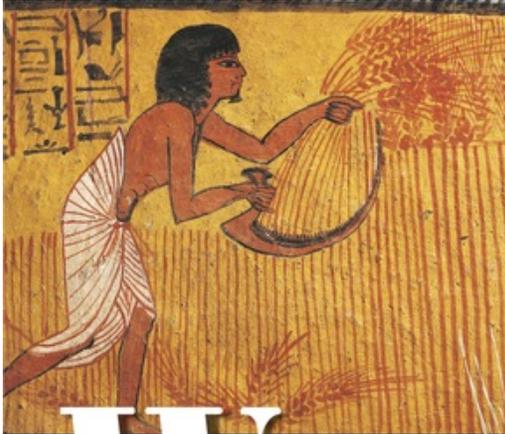


WORLD FOOD

An Encyclopedia of History, Culture, and Social Influence from Hunter-Gatherers to the Age of Globalization



Mary Ellen Snodgrass



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80 Business Park Drive

Armonk, NY 10504

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Library of Congress Cataloging-in-Publication Data

Snodgrass, Mary Ellen.

World food: an encyclopedia of history, culture, and social influence from hunter-gatherers to the age of globalization / Mary Ellen Snodgrass.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-7656-8278-9 (cloth: alk, paper)

1. Food—History—Encyclopedias. 2. Cooking—History—Encyclopedias. I. Title.

TX349.S66 2013

641.303—dc23

2012014375

Printed and bound in the United States

The paper used in this publication meets the minimum requirements of American

National Standard for Information Sciences—Permanence of Paper for Printed
Library Materials,
ANSI Z 39.48.1984.

CW (c) 10 9 8 7 6 5 4 3 2

Publisher: Myron E. Sharpe

Vice President and Director of New Product Development: Donna Sanzone

Vice President and Production Director: Carmen Chetti

Executive Development Editor: Jeff Hacker

Project Manager: Laura Brengelman

Program Coordinator: Cathleen Prisco

Editorial Assistant: Lauren LoPinto

Text Design and Cover Design: Jesse Sanchez

Every social gathering and holiday is
With a feast begun and terminated;
And before our heads can have their say,
Our bellies must be fully sated.

Pellegrino Artusi

La Scienza in Cucina e l'Arte di Mangiar Bene, 1891

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Wild Food

Preface

World Food examines the spectrum of comestibles as they apply to history, politics, economics, medicine, nutrition, ethnicity, worship, and invention. For the convenience and edification of the teacher, student, researcher, chef, and food faddist, the text summarizes specifics of eating history—the development of humankind from hunter-gatherers to Turkish herders and German vintners, the marketing of foodstuffs at the produce stalls of Nice and the canal boats of Bangkok, and the exploitation of valuable edibles by Sri Lankan planters and Spanish conquerors. The issues of the present—improvements in the packaging, sanitation, and transportation of perishables—forecast the future of nontoxic, nourishing food for both the privileged and the have-nots.

The list of entries covers travel writers (Ibn Battuta, Herodotus, Marco Polo), growers (Thomas Jefferson, Jethro Tull), preparers (Huou, Apicius, Pierre La Varenne, Julia Child), marketers (Agnes Marshall, Luther Burbank), scientists (James Lind, Nicholas Culpeper, Carolus Linnaeus), and corporations (Swedish East India Company, Virginia Company of Plymouth, McDonald's). National tastes figure in entries on specific examples of diet and cuisine—Russian, Inca, Indonesian, Portuguese, Byzantine—and in the preparation of such ethnic specialties as tofu, bushmeat, chowder, kebabs, dal, and condiments.

Essays particularize flora and fauna that impact world events—beef and corn and maize in the settlement of North America, einkorn and emmer wheats in the evolution of bread, the buffalo in the gastronomy of Plains Indians, and tea in the socialization of Japan and China. Food processing attests to the ingenuity of cooks and industrialists and its importance in world history, notably pasta in the industrialization of Sicily, tortillas in Latin America, chutney in India, pemmican in the success of the Hudson's Bay Company, whiskey in the struggle between imbibers and abstainers, salt and vinegar to early miners and vegetable preservers, biscuits and bouillon to expeditions and military provisioners, and baby food and infant formulas for child nutritionists.

In addition to kitchen staff and grocery dealers, gastronomy overlaps the concerns of altruists and activists, including ecofeminists, the battlefield cookery

of Mary Jane Seacole during the Crimean War, the relief kitchens of Alexis Soyer to mitigate the Irish Potato Famine, rationing during world wars, soup kitchen cooks, and U.S. supply airlifts to the Burma Road and war-ravaged Berlin in the 1940s. The ethical sale and consumption of food permeates entries on food taboos, halal, biopiracy, prohibition, peyote, kosher food, alcoholic beverages, and vegetarianism. Some of the most serious issues emerge under the headings of commodity riots, famine relief, and endangered species.

The role of exploration in acquainting consumers with new possibilities in table fare elevates the importance of Christopher Columbus, Captain James Cook, Amédée François Frézier, Giovanni da Verrazzano, and Hernán de Cortés. Entries on trade routes and trading vessels, caravans, clipper ships, and world trade summarize the successful conveyance of such perishables as yams, strawberries, and birch beer. From the transporters' holds, crates and bags pass to the operators of food inspection and safety, commodity regulation, public markets, food cooperatives, cooking schools, and farm subsidies and government agricultural programs. More technological matters fill essays on freeze-drying, refrigeration, monoculture, food storage, hormones in food, Count Rumford, and seed trade.

Peripheral issues stress the crucial nature of food intake to well-being, the focus of articles on obesity, nutrition, food allergies, curative foods, fads, adulterated and poisonous foods, and additives and dyes. An overview of the food preparer in grilling, barbecue, saucing, pickling, cook-offs, espaliering, animal husbandry, and milling emphasizes the continued importance of the individual in feeding the world. A thorough survey of world food would not be complete without the evolution of agriculture into agribusiness, the rise of barter as a means of negotiation, foods used as currency, garbage disposal in middens, the selection of recipes for cookbooks, the invention of cookware and blenders and food processors, the representation of dining in the arts and film, and future concerns for traditions, customs, and food in the afterlife.

Research involved delvings into a range of literature, beginning with retrospects on the Paleolithic diet, the Fertile Crescent, the Silk Road, the tea ceremony, and the fare of the Crusaders. In addition to the biographies of Charlemagne and Catherine de' Médici, food critiques derived from chronicler Garcilaso de la Vega, sugar refiner Jules Paul Benjamin Delessert, esthete Jean Anthelme Brillat-Savarin, environmentalist Rachel Carson, ethnographer

Bernardino da Sahagún, horticulturist Antoine Nicholas Duchesne, folklorist and columnist Linda West Eckhardt, encyclopedist Pliny the Elder, and infantryman Bernal Díaz. The best in pantry and dining histories came from the works of Ken Albala, Sidney C.H. Cheung, Linda Civitello, Andrew Dalby, Alan Davidson, Yiu H. Hui, Michael Kronl, Andrew F. Smith, and Maguelonne Toussaint-Samat as well as articles from *Archaeology*, *History*, *Mother Earth News*, *National Geographic*, *Saudi Aramco World*, *The New York Times*, and *Vegetarian Times*.

Rounding out the text, additional study aids and special sections elucidate individual foods, events, and concepts:

Topic Finder classifies the encyclopedia's more than 350 articles into general subject categories.

Chronology covers events from the origin of cooked food to the twenty-first century. Entries recognize the importance of the natural changes that coagulated yogurt and fermented grape juice and the marches and voyages that generated awareness of world cuisines and customs. Landmarks note the transplanting of New World breadfruit, publication of cookbooks, and environmental research into adulterated food and pollutants. Within events are the achievements of notable figures in related fields.

Appendix of Herbal Foods and Uses reveals the multiple applications of native flora to recipes, wellness, and alternative medical treatments. Sources include chaparral, a Mexican and South African heath plant that flavors a tea and cure for cough; ginseng, an age-old Chinese nostrum used in candy and for treating malaise and poor appetite; bergamot, an Ojibwa salad green valuable for relieving insomnia; and scurvy grass, a British salad and potherb that supplies the body with vitamin C to combat loose teeth and bleeding caused by a nutrient deficiency. The listings mention slippery elm and yarrow, two favorites of Australasians and the Cheyenne for skin disease and infected wounds, and willow, a food for beekeeping in China and a multinational ingredient in an analgesic tea once prescribed in Assyria, Egypt, Greece, and Sumer.

Glossary of terms defines the use of tagines and mando-lines, invention of the bain-marie and *shaduf*, philosophies of macrobiotics and the frugivore, treatment

of zoonosis and imbalance in the four humors, creation of forcemeat and gene banks, and differences among the gastronome, gourmand, epicure, and gourmet. Perspectives on food history explain value judgments concerning heritage foods, national dishes, and idiocuisine. Key terms—*terroir*, *fermentation*, *agribusiness*, *curing*, *food justice*—lend insight to such issues as where and how to grow, preserve, and market comestibles for the benefit of all.

Acknowledgments

I could not have completed this text without advice from a long list, which follows, of researchers, chemists, archivists, chefs, travelers, gourmands, farmers, and especially reference librarians, the backbone of scholarship. Historical societies, university libraries, the Library of Congress, book and film reviewers, and specialists in food preparation and marketing elucidated various details. Charity workers and church and ethnic authorities suggested variant points of view on famine in East Africa, the agricultural advances of Norman Borlaug, child malnutrition along the Sahel, and the dietary compromises between faith groups in India and China. I found particularly helpful the databases of the Alexandria Street Press, UNICEF advisories, and the additions of Laura Brengelman concerning endangered flora and fauna.

Special thanks to Martin Otts and Mark Schumacher for running down sources and bibliography information and to Eileen Lawrence and Stephen Rhind-Tutt for the use of Anthropology Online and Women and Social Movements, International, two databases hosted by Alexandria Street Press. Blessings on Mary Canrobert for answering my myriad questions about Chinese grocery stores and hot shops. As always, I rely on editor Jeff Hacker and my publicist, Joan Lail, for dissuading me from folly.

Jason Achiu, reference, Hawaii State Archives, Honolulu, Hawaii
Belk Library, Appalachian State University, Boone, North Carolina
Beth Bradshaw and Martin Otts, reference librarians, and Mary Sizemore,
Patrick Beaver Library, Hickory, North Carolina
Brown University Library, Providence, Rhode Island
Burton Library, George Mason University, Fairfax, Virginia
Julie Byrd and Terri Cain, Catawba County Social Services, Hickory, North
Carolina
Mark and Mary Canrobert, former residents of Souzhou, China
Bonnie Chandler, reference, Columbus Public Library, Columbus, Ohio
Sergei Demchenko, restaurateur, Odessa, Ukraine

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Introduction

Food history refuses to stay in the market basket. Eating is too important to humankind for its story to boil down to tidy pantry lists and shortbread recipes. The best in dining ranges from Charlemagne's Easter feasts and exotic food club banquets to soul food pig pickins' and the *pièces montées* of nineteenth-century French master chef and author Marie-Antoine Carême. An overview of how people choose, prepare, and consume edibles strays into camel caravans, Christmas Eve, ships' galleys, potato chip factories, Aztec mano and metate, and Ramadan.

A comprehensive history of human sustenance looks back many millennia for glimpses of roasting chestnuts at the fireside of Belgian Celts and pressing wild plums for juice along the Fertile Crescent. Preceding the skills of the Halifax sea captain and Alexandrian grocer, the instincts for paddy patterns and the best weather for combining ensure ample harvests of rice and wheat. The knowledge of provisioners, meat carvers, and bakers incorporates the finer points of coopering barrels for stowing Norwegian dried cod, impaling agave and beef heart for pit roasting, and creaming lard and castor sugar for icing hot cross buns and stollen.

Tucked deep into prehistory lie the menus of Hopi, Australian Aborigines, Berbers, and Greenlanders. Stirring moments in the culinary past juxtapose the first fermentation of Greek yogurt and the clubbing of wild rice into Cree canoes with the establishment of Chinese restaurants along the path of the Union Pacific Railroad and the pioneer squeeze tubes that extruded fruit for early space crews. Improvements to oyster trading on Southeast Asian sampans parallel the development of Carnation canned milk and the debut of containerized pineapples lifted by gantry aboard Dole's transoceanic steamers. Awards for innovation extend credit to salt rinds on Dutch cheese, Ball's improved canning jar, Japan's first rice-winnowing basket, and upgraded shrink-wrap to protect Irish salmon.

Overall, the story of food consumption reveals the rudiments of human life. Like breathing and sleeping, eating sequences the regular satisfaction of needs that connects appetites to nature. The urge to sip and chew explains teatime and

the coffee or *yerba buena* break and justifies the search for newer titillations of the taste buds with sashimi, passion fruit, Kaffir lime, hummus, near beer, vitamin water, deep-fried pickles—anything new or unusual. So long as the drive persists to delight in aroma and mouthfeel, the consumer will scan grocery shelves and restaurant menus and pay the price.

WORLD FOOD

A

[Abreu, António de \(ca. 1480—ca. 1514\), and Francisco Serrao \(?—1521\)](#)

Explorer António de Abreu, an experienced sea voyager, and his second-in-command, Francisco Serrao, introduced the Portuguese to a monopoly on cloves and nutmeg in Indonesia that broke the Arab and Venetian control of luxury spices in the early sixteenth century.

Intrigued by adventurer Ludovico de Varthema's tales of Bandanese nutmegs and Moluccan cloves in 1502, Afonso de Albuquerque, Portugal's viceroy to India at Goa, dispatched a three-ship fleet from the Bay of Bengal to Malacca in December 1511. He instructed the crew to reconnoiter the Spice Islands, where clove and nutmeg trees flourished on the five-island cluster. Buyers in London, Paris, and Rotterdam paid princely amounts for nutmeg, a preservative for meat, tranquilizer, sleep inducer, and alleged deterrent of bubonic plague. In the flagship *Santa Catarina*, de Abreu, serving as the ambassador of commerce, hired three Javanese pilots and 120 men to crew the two caravels and an Indian supply ship from the Strait of Malacca east through uncharted seas toward Java.

The fleet reached Gresik, Java, in sight of terraced rice fields and exotic fruits. The first Europeans to discover Banda and the Pacific Ocean, de Abreu's crew advanced directly to the heart of a global bonanza, spices bought cheap and sold with a 30,000 percent markup. The Portuguese sailors encountered a lively sea emporium that had drawn Chinese merchants in junks for centuries. De Abreu exchanged bells, bracelets, and trinkets for cloves, the sepals of red tubular flowers that dotted 40-foot (12-meter) trees.

Nutmeg trees grew to 50 feet (15 meters) and produced a quince-shaped fruit. Covering the nut at the center, mace had its own distinctive flavor from the kernel, which users grated for its spicy scent and tangy taste. The wholesale cost was so low that de Abreu anticipated a tenfold profit in Lisbon. De Abreu raised a stele acknowledging Portugal's annexation of the Banda Islands. He died in the

Azores on his return trip to Portugal.

Before the voyage to the Portuguese home port in India in December 1512, greed inspired de Abreu to overtax his vessels. Francisco Serrao, skipper of the second caravel, the aged *Sabaia*, burned the leaky hull and purchased a junk, on which he loaded cloves, mace, and nutmegs. Another product of the islands, dead flycatchers, honeyeaters, kingfishers, and pigeons covered in elegant plumage, brought high prices on the fashion market.

On the return journey to Malacca, winds beached Serrao's junk off the island of Pude. He and his crew commandeered a pirate outrigger and sailed to Hitu, where a tribal chief treated the Portuguese to attractive women and a banquet of fowl and goat meat, cups of arak (anise liquor), and dishes of sago, the main food of the Malay people. They encountered bamboo as thick as a man's leg, a source of pure, refreshing water.

To increase their power and income, the islanders sought reliable trading partners. Clove growers on Ternate and Tidore arrived by outrigger canoes to court potential purchasers of cloves. Serrao remained in the islands as prime minister to the king of Ternate, which became the center of the Portuguese spice trade. Ferdinand Magellan, a friend and cousin who had accompanied him on the voyage, parted ways and continued sailing, eventually leading the first expedition (1519–1522) to circumnavigate the globe.

After a follow-up expedition arrived in the Moluccas in 1514, Portuguese merchants set up regular voyages between outposts in Molucca and India and collaborated with the Dutch in distributing spice to sellers along the Rhine River valley. Serrao died in Ternate in 1521 a short time before Philippine natives killed Magellan in a skirmish.

See also: House of India.

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Additives, Food

The adjustment of taste, aroma, texture, and longevity in modern food derives from some 2,800 additives. Since the seventeenth century, processors of food have relied primarily on natural additives—salt, smoke, sugar, and vinegar—to enhance the flavor and shelf life of beef, century eggs (preserved eggs), ham, herring, hominy, *kimchi*, lutefisk, salmon, and sauerkraut. The Industrial Revolution increased reliance on other modifications. A common example, carbon dioxide, a harmless gas, creates effervescence in beer, mineral water, and whipped topping. A safe and effective thickener, cellulose from cotton lint or wood pulp congeals diet food and pie filling. Casein, a milk protein, thickens sherbet. Corn syrup has the same effect in marshmallows, much as various food starches condense baby food. Citric acid flavors instant potatoes; chicory root sweetens granola. Malt ferments beer; quinine enlivens tonic water.

Some additives alter appearance, such as bleaches (chlorine), glazers (paraffin), humectants (urea), and anti-caking (talc), defoaming (silicone oil), and bulking agents (nuts and arrowroot). Algae, egg yolk, kelp, pectin, whey, and other emulsifiers maintain the smooth blend of coffee creamers, cranberry sauce, jam, and mayonnaise. The beeswax that glazes cheese rounds and melons and the paraffin coating on apples, chocolates, and cucumbers prevent deterioration from the action of air, bacteria, fungi, and light. Soybeans and tapioca provide the texture in imitation meats, such as veggie burgers, faux crabmeat, and tempeh. Flavorants increase the smell and taste of familiar processed foods—apple acid in iced tea mix, esters in Juicy Fruit gum, lactic acid in cheese, and phosphoric acid in Coca-Cola.

Food dyes, a common food additive, contribute the natural shades of alfalfa, algae, blueberries, caramel, carrots, elderberries, grapes, mushrooms, peas, and

turmeric to enhance the eye appeal of products such as Kool-Aid, M&Ms, popcorn, and wine. Consumers associate annatto yellow with margarine; ascorbic acid with canned peaches; beet red with icings, puddings, and yogurt; dextrose with brown bread crust; paprika with salad dressing and tomato soup; saffron yellow with rice; and strawberry red with jelly.

Carmine, the red dye in cider and chewing gum and on hot dog and sausage casings, differs from vegetable dye in that it derives from the *Dactylopius coccus*, an insect that infests the opuntia cactus in Central and North America. Because of its animal source, vegans and vegetarians avoid it. Orthodox Jews ban carmine from kosher foods. Hindus, Jains, and Muslims also demand oversight of food enhancement to restrict animal by-products, particularly rennet from the stomachs of ruminants and gelatin obtained from animal bones, hides, and hooves.

For binding and texture, packagers of ready-to-eat foods into the early twentieth century added potato and rice flour, oat fiber, and soybean products, the standard thickeners that gave authentic mouthfeel to ice cream and tomato ketchup. When a new wave of synthetics compromised food quality, the Pure Food and Drug Act of 1906 approved orange dye, the first synthetic tint. The law also allowed six other artificial colorants, ranging from red pink, and yellow to indigo and black. Also deemed safe were dyes on orange peels and maraschino cherries and in butter and red velvet cake. In 1938, the Federal Food, Drug, and Cosmetic Act enumerated food tints such as amaranth, labeled Red No. 2.

On January 1, 1958, the Food Additives Amendment identified 700 safe food substances and banned such carcinogens as cyclamate and lead and halogenated compounds. New regulations required specific clearances for questionable additives, including binders, enzymes, gelatin thickeners, stabilizers, and texturizers. In 1960, the Color Additives Amendments delisted some of the colors previously classified as safe for use in food, notably, blue 2, green 3, orange B, red 3, and yellow 5 and 6. Thereafter, the United Kingdom reduced its approved food dyes to 16, and Canadian health officials banned azo compounds, the source of nearly 70 percent of all dyes. Norway and Sweden proscribed all colorants as health hazards. In March 2011, China forbade millers from bleaching wheat flour.

Worldwide, biochemists investigate the effects of antinutritional additives on internal organs, as well as on diabetics, hemophiliacs, and pregnant women and

fetuses. Nutritional watch lists continue to question the antioxidant butylated hydroxyanisole (BHA) in cereal and oil, caffeine in cocoa and energy drinks, potassium bromate in bread and rolls, diacetyl in butter-flavored popcorn and sour cream, caramel coloring in soy sauce, and aspartame and other artificial sweeteners in diet products. All of these chemicals increase cancer risks.

In 2010, the United Nations published the findings of a global consortium on specific food additives. The group, consisting of members of the Food and Agriculture Organization and the World Health Organization, found acceptable cassia gum in cream cheese and lycopene food color from tomatoes in sauces. The consortium required more study of gum arabic and nitrous oxide in bread and recommended limited consumption of cyclamates in energy drinks, especially for children.

More recent concerns target guar gum in cottage cheese, nitrates and nitrites in cured meats such as bacon and salami, propyl gallate in chicken soup, and the use of antibiotics in cattle.

See also: Adulterated Food; Allergies, Food; Guar; Hormones in Food; Monosodium Glutamate; Organic Foods.

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[Adulterated Food](#)

Corrupt and bogus foods have threatened the well-being of the human community since prehistory. Adulterants derive from natural deterioration, domestic and industrial contamination, and extenders introduced during processing, packaging, and storage.

As a business and public relations measure, early commodities sellers recognized standards that protected consumers from spurious additives, such as the blending of fresh goods with stale or spoiled stock and the masking of foul odors. Book four of the Indian Kautilya's *Arthashastra* (*Statecraft*, ca. 300 B.C.E.), an economic advisement to the first Maurya emperor, authorized the penalizing of market cheats for adding filler to alkali, grain, oil, and salt, watering milk, or stretching flour with ground alum, bone, chalk, plaster, or stones. As described in the Confucian ritual text *Zhouli* (*Chou-li, Rites of Chou*, compiled ca. 1116 B.C.E.), similar oversight in Chinese markets confirmed the quality of goods from food processors, public kitchens, and wineries.

For the average consumer, warnings about adulterated food traditionally required more education than most possessed. Greco-Roman officials inspected wholesale goods and fined vendors for applying gypsum, lead, and lime as sweeteners in wine and soft white silt to bread. During the fifth decade of the Roman Empire encyclopedist Pliny the Elder warned in his *Historia Naturae* (*Natural History*, ca. 77 C.E.) of grain adulteration in Tunisia, where dealers added 25 percent gypsum to emmer grain, the basis of common porridge.

Florentine merchant Francesco Balducci Pegolotti, a late medieval consumer advocate, composed *Pratica della Mercatura* (*Merchant's Handbook*, ca. 1343), a guide to measures and standards for fruit, honey, loaf and granular sugar, molasses, potash, salt fish, and wine. He warned of irregularities in packaging and weights and measures as well as the length of time goods traveled over known routes. In London, sellers of putrid meat and spice vendors who padded their stocks with extenders suffered pillorying over a fire of offensive goods. In Nuremberg, Germany, conspiracy to defraud consumers could result in defrauders suffering exile, lashing, lopping of ears or nose, blinding, poisoning, drowning, burning, or being buried alive.

Fraudulent Food

Merchants shared ill fame with professional cooks. Caterers adulterated food through menu substitutions, supplanting boar with pig, caviar with fish roe, stag with beef, veal with sturgeon, even imitation meat from almond paste and dried fruit grilled on a spit. In fifteenth-century Sicily, bakers color-coded bread quality—pure white loaves for the rich, dark to black loaves for the poor. In times of famine, the wealthy continued to eat well, but the lowest class ate loaves permeated with grain substitutes—bean husks, berries, grass, leaves, nuts, parsnips, sawdust, seeds, squash, and wild radish and asparagus. In *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1540–1585), culinary historian Bernardino de Sahagún encountered a swindler in Mexico who concocted amaranth seeds, chalk, and wax into dough and sold it as cacao beans.

Honey offered the dishonest opportunities to sell rancid or spiked goods. In England, a lawsuit over sulphurated honey set buyer against seller in 1457, with damages assessed at 40 shillings. Elizabeth I fought such faulty commodities by proclaiming a purity act of 1580 requiring bona fide labeling of honey. Those selling counterfeit produce risked a penalty of 6 shillings 8 pence. The following year, similar stringent regulations forbade the contamination of beeswax with resin, tallow, or turpentine. European standards appear to have dropped in the mid-1700s, when apothecary John Hill reported honey contaminated during collection and laced with flour. To ensure quality goods, he recommended buying only thin, transparent stock.

Worldwide, the adulteration of foodstuffs has involved innovative addition of almond oil, alum, elderberry juice, limewater, sugar, sulphuric acid, tartar salts, and turpentine to foodstuffs. Domestic manuals, including *The School of Arts*, a handbook published in 1754 by the Royal Society of Arts, suggested testing for chalk in flour by mixing a sample with vinegar or lemon juice, which generates bubbles in calcium carbonate (though an absence of bubbles does not ensure purity). When taoism influenced food selection and preparation, poet Yuan Mei, author of *Shih Tan* (*The Menu*, 1796), advocated inspection of pigs and chickens for disease. For bird's nest soup, he declared that no feathers should mar the broth. On the subject of sea slugs and sharks, he urged rinsing out sand and mud, which inflated the cost and threatened teeth with grit.

Early Food Analysis

In 1820, mineralogist and analytic chemist Friedrich Christian Accum, apothecary to George III, issued *A Treatise on the Adulterations of Food and Culinary Poisons*. The jeremiad, subtitled “There is Death in the Pot,” exposed sham Chinese tea consisting of dried thorn leaves dyed with toxic verdigris and also warned of blancmange laced with copper arsenite, a deadly food dye. Because he named names, angry food adulterers forced him to flee to Berlin. Corroborating Accum’s identification of lethal commodities, the *Edinburgh Magistrates Minute Book* from September 7, 1847, warned that a Dalkeith veterinarian observed provisioners salting, slicing into roasts, making into pies, or grinding into sausage the carcasses of cattle felled by disease. In this same period, John Marius Wilson’s *The Rural Cyclopaedia* (1849) exposed Edinburgh dairies that removed cream from milk and thickened and whitened skim milk with magnesium carbonate or rice or wheat flour. Additional milk camouflage involved adding ground almonds or hemp seed and egg whites to simulate a creamy consistency.

In the 1850s, when the Industrial Revolution made laborers more dependent on processed foods than on home gardens, Arthur Hill Hassall, another British consumer advocate, found nearly half of arrowroot in London markets to be blended with potato flour. With a microscope, Hassall identified chicory in coffee, a substitution that kept the cost low in a highly competitive market. He also uncovered irregularities in name brands—Frys and Cadbury cocoa, Crosse & Blackwell condiments, Fortnum & Mason’s sauces, and J. & J. Coleman mustard. His crusade disclosed red earth in French tomato sauce and burned treacle in Indian soy. Hassall’s praise for Borden’s Patent Meat Biscuit so improved sales that firms sought his certification on food labels. An American contemporary, commercial beekeeper Moses Quinby of New York, complained that food tainters pumped glucose and maple syrup into honey to inflate profits and extend shelf life. Consumers rashly blamed exporters of foreign goods for polluting packaged foods, but investigators found most deception among conspirators closer to home.

During the rise of home economics to a profession in the mid-nineteenth century, the media published warnings about wheat flour adulterated with plaster of paris, copper salts in pickles and bottled fruits and vegetables, oil of vitriol in vinegar, and red lead in cayenne pepper. In 1850, Thomas Wakley,

editor of *The Lancet*, England's primary medical journal, established the Analytical and Sanitary Commission, which vilified chemical enhancement of 2,500 foodstuffs. Commissioners impugned cider passed off as wine, copper and lead salts in candy, iron compounds in fish and potted meat, poisons in beer, potash lining in bottles, rancid butter, red lead in cheese, and turmeric in mustard.

Within five years of empanelment, analysts, aided by London medical officer Henry Letheby, prompted the English parliament to halt food fraud by passing the Food Adulteration Act of 1860. The commission noted that the lower class suffered from purchase of the most polluted and least authentic foods and palliatives, such as caffeine, cocaine, and opium in soda fountain drinks and morphine-laced soothing syrups for babies. The Adulteration of Food, Drink, and Drugs Act of 1872 put more bite into enforcement. By the 1890s, English market goods were purer and safer.

Pure Food Movement

Americans demanded similar strictures. As early as 1641, the Massachusetts Bay Colony protected meat and pork from impurity and appointed a bread inspector. In 1876, industrialist Henry J. Heinz guaranteed customers wholesome tomato ketchup rather than tomato sauce adulterated with turnips or wood fiber. He sold his spicy blend in glass bottles but his candor failed to protect the public from the most debased goods. In 1882, inspectors in New York City published tampering rates in the least dependable goods: coffee (90.5 percent), candy (70.0 percent), brandy (64.0 percent), and spices (62.2 percent). To alert Congress and the Federation of Women's Clubs to the danger of additives, author Ella Hoes Neville stated the difference between cheating and poisoning the public: "Give us short measure and we lose; give us adulterated food and we die."

Before the U.S. Congress authorized the federal government to inspect, test, and approve foods and food additives in 1883, Harvey Washington Wiley, chief forensic chemist of the U.S. Department of Agriculture, led a 30-year crusade for food safety and purity standards. A subsequent campaign begun by the Michigan Women's Christian Temperance Union attacked impure comestibles and drugs.

Led by dietitian Ella Eaton Kellogg, author of *Science in the Kitchen* (1892), the women challenged dangerous and unhygienic foodstuffs. Echoing her concerns, the Department of Agriculture found that additives and fillers were an industry standard in processed foods.

In *Air, Water, and Food: From a Sanitary Standpoint* (1901), a classic study of the human need for safe life-giving elements, authors Ellen Swallow Richards and Alpheus Grant Woodman devoted much of their text to adulterated food. They warned of unscrupulous dealers and specified the dangers of baking powder containing alum, ginger mixed with turmeric and redwood sawdust, wood ash in rancid pork, and watered milk colored with coal tar and preserved with benzoic acid, borax, formaldehyde, or potassium chromate. Whereas they found flour and rice usually pure, ginger, mustard, pepper, and wine tended toward heavy defilement. The authors also suspected currant, grape, and raspberry jellies, which sometimes contained only processed, sugared, and colored apple cores and peelings.

In part, Richards and Woodman blamed the public for such unrealistic demands as oysters and summer fruit and vegetables out of season. They encouraged readers to be skeptical of abnormally bright colors in canned foods, such as green canned peas and pickles brightly colored by copper salt dye. An editorial in the *New England Kitchen Magazine* concurred that dishonesty would thrive as long as the consumer remained naive and unsuspecting. At the height of social activism, feminist Charlotte Perkins Gilman's *The Home: Its Work and Influence* (1903) declared that bad food found its way into homes because the housewife was untrained in identifying additives.

On June 30, 1906, at the urging of President Theodore Roosevelt, the U.S. Congress passed the Pure Food and Drug Act, which launched an interstate watchdog on fraudulent, mislabeled goods. A stronger version in 1938 opposed unwholesome food by authorizing factory inspection and seizure of proscribed goods.

Renewed Vigilance

When a new wave of synthetics compromised American foodstuffs in the post-

World War II era, a congressional committee investigated for 21 months. Impaneled in June 1950 and chaired by Representative James Joseph Delaney (D-NY), the group heard testimony on chemical additives and noxious substances in food. Although the committee issued four volumes covering unwholesome foods and fluoridated water, Congress ignored the committee's recommendations for seven years. In 1958, the Food Additives Amendment banned such carcinogens as lead and halogenated compounds and required clearance of questionable additives, including binders, enzymes, gelatin thickeners, stabilizers, and texturizers.

Early in 2001, a new product for identifying dangerous levels of lead set consumers' minds at rest on the subject of toxic metals in food cans and water. Homax Products in Bellingham, Washington, began distributing LeadCheck, which identified lead in dishes, a problem that the U.S. government estimated occurred at the rate of one in seven sets. The product was the invention of chemical engineer Marcia J. Stone at Hybrivet in Reading, Pennsylvania, a diagnostician for DuPont and New England Nuclear. The kit offered test swabs and reagents that turned pink or red if they came in contact with leachable lead, which could damage brain tissue in the unborn.

See also: Disease, Food-Borne; Hormones in Food; Inspection and Safety, Food; Plant Disease and Prevention; Poisonous Foods.

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[African Diet and Cuisine, Sub-Saharan](#)

Tropical and southern African gastronomy incorporates varied tribal and language groups, each following its own culinary methods of preparing local ingredients. Because 60 percent of the area is agrarian, sub-Saharan Africa produces homegrown food and supplements fruit and vegetables with fish netted from local waterways. A model recipe for *maafé* (rice stew) with peanut, spinach, and tomato sauce derives input for each variation by Angolan, Gambian, Ivory Coast, and Wolof cooks. Ghanians contribute pierced boiled eggs, which soak up juices; Ivory Coast preparers stress tomatoes and tomato paste; Senegalese add cabbage and eggplant; the Bambara of Mali accentuate sweet potatoes and turnips. In the centuries after the slave diaspora, African American versions of *maafé* supplanted peanuts with peanut butter.

After 6000 B.C.E., continental nomads based meals on meat from cattle, goats, and sheep. Wanderers benefited from trading stock with disparate groups, thus acquiring more culinary diversity in dried fish, fruits, greens, and tubers. Unique combinations anchored societies to regions and defined ritual feast cycles, such as the yam festival that ended the Ashanti hungry time and marked the annual Ibo thanksgiving. Simple kitchen arrangement involved the balancing of a single pot on three stones over a fire. A sedentary lifestyle made possible melon patches and lettuce and nettle crops and the gathering of wild jackfruit and passionfruit.

During the slave trade in the 1800s, the importation of cassava, peanuts, and peppers made the first impact of outsiders on Congo rain forest dishes of *fonio* (millet), griddle breads, millet, and native rice. Despite the drain of human bondage on the citizenry and the introduction of European diseases, the boost to food security increased the West African population. Arab, Indian, and Portuguese traders carried hot pepper pods as handy pocket currency and a kitchen garden curiosity for buyers in São Tomé and Zanzibar. The cuisine of Africa's long shoreline profited from the long-distance swap, which added pungency to bland dishes.

Culinary Blossoming

Cassava, cocoyams, and yams added sweetness to Nigerian *patten doya* (yam pottage) and greens to *kuka* (baobab leaf stew), a heritage dish made by the

mother of Sundiata, the thirteenth-century epic hero of the Mali Empire. In Ghana, cassava provided starchy roots for pounding into *fufu*, a national dish served with dried or smoked fish, guinea fowl, and *suya* (shish kebabs), a spicy Hausan grilled meat in Niger and Nigeria. Coconut, guinea pepper, néré seeds, palm oil, peanuts, and shea butter flavored sauces for chicken, corn and pea fritters, okra and pumpkin seed soup, rice, and wild bushmeat from antelopes, bush rats, crocodiles, giant snails, simians, and warthogs.

Plantain supplied a staple food crop in East Africa, but its nutritional deficiency resulted in disease and death among pregnant women and an infant mortality rate of more than 30 percent. As a result of shortened female life spans, polygynous men accumulated multiple wives. In Mozambique, a more nutritious kitchen preparation involved quartering green plantains for grating into coconut milk and lemon juice.



The cooks at a street restaurant in Dakar, Senegal, prepare a traditional dish of seasoned fish and white rice with vegetables. Fish is a dietary staple in coastal West Africa. Starchy tubers and root vegetables, peanuts,

tomatoes, and palm nut oil are also common. (*Georges Gobet/AFP/ Getty Images*)

Mixtures of black-eyed or field peas, eggplant, locust beans, okra, pumpkin, and squash wrapped in banana, cabbage, plantain, or roselle (hibiscus) leaves fed families with handheld portions. The tight bundles, spiced with coriander and ginger, steamed fish and root vegetables while retaining aroma and savor. The Yoruba washed down their servings with sweet roselle juice.

The arrival of New World chili pepper and tomatoes in the sixteenth century altered recipes for dried and flaked fish and goat, the dominant meats, and steamed *moimoi*, a Nigerian bean pudding. The additions presaged the basic colors and flavors of Brazilian, Cajun, and Creole cookery. An open-ended recipe for one-pot Gambian *jollof* rice, a parallel of Arab pilaf, Iberian paella, and Louisiana jambalaya, invited the cook to improvise in apportioning the flavors of onion, pepper, and tomato. For these spicy meals, West Africans drank millet beer and palm wine as table beverages.

To the east, herders sold cattle, goats, and sheep, keeping only blood and milk for their own meals. Heavy reliance on coconut, grains, and rice anchored meals to carbohydrates, such as Ugandan *matoke*, steamed green bananas. Around 1000 C.E., when Arab traders settled among Swahili speakers, bland African fare acquired Persian flavors from cinnamon, cloves, pomegranate juice, and saffron. The introduction of Peruvian corn in the 1500s supplied the ingredient for *ugali*, a staple starch similar to fufu and eaten with meat and vegetable stews. During the diaspora, Africans bore recipes for corn mush to the West Indies.

In the early sixteenth century, fields of Mesoamerican corn along the Gold Coast attested to a continent-to-continent food transfer and stimulation of population growth. Only the coastal Axumites and residents of the Volta River delta clung to rice as the dominant cereal. Portuguese traders demonstrated pudding making and the marination, basting, and spit-roasting of pork joints in fragrant sauces. Iberian marinades relied on chilies, citrus juice, pineapples, and tomatoes, uncommon ingredients in African entrées. British influence transported Indian specialties to African colonies. By incorporating chapatis, chutney, curry, lentil soup, and pickles to gastronomy, East Africans developed indigenous flavors to new heights.

Fusion Cuisine

Farther north in Eritrea, Ethiopia, and Somalia, communal dining centered on finger food and bread as both a carbohydrate and utensil. Diners relied on *injera*, a spongy sourdough flatbread made into convenient rounds from barley, corn, sorghum, teff, or wheat. The regional complement, *hilbet*, involved the creaming of fava beans and lentils into a paste. Because of Coptic Orthodox Christian, Islamic, and Jewish food taboos, families avoided alcohol, horse meat, pork, reptiles, shellfish, and wild birds and game. Peasants preferred dried peas, noodles, and oat porridge with honey to fresh vegetables. The more sophisticated Somali spiced basmati rice with cardamom, cinnamon, cloves, cumin, and sage and drank spiced tea Arab style.

The centrality of South Africa to world trade brought the food of outsiders to the local Sotho, Xhosa, and Zulu, an agrarian and pastoral tribal network that overran the aboriginal Khoi herders around 1000 C.E. To Khoi brewing, spit-roasting impala and ostrich, and biltong (jerky), colonists from Britain, France, Germany, Holland, and Portugal added the traditions of barbecuing, *boerewors* (sausage), and pig's feet with beans. Complementary dishes of corn mush, onion and tomato sauce, and yogurt supplied energy and vitamins. To the northeast in Zambia, the rural Bemba maintained a peasant diet of fish, game, insects, and wild fruit as additives to kitchen garden greens, gourds, and cowpeas. They farmed by the swidden system and cooked by methods passed from mother to daughter.

From the mid-eighteenth century, South African recipes displayed the venturesome combinations of innovators, especially *bobotie*, a Malaysian meatloaf with bananas, coconut, and raisins, and *isidudu*, a gruel of cabbage, liver, and pumpkin served with a milk dressing. Indian restaurateurs added bunny chow, a quarter loaf of bread hollowed and stuffed with curried vegetables. Beach communities developed recipes for fish stew and broiled and steamed crayfish, lobster, mackerel, mussels, octopus, oysters, shrimp, and tuna.

See also: African Food Trade; African Slave Diet; Bushmeat; Malnutrition; Soul Food; Swiddens; Taro.

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[African Food Trade](#)

Referred to by archaeologists as "the cradle of humanity," Africa abounds in natural resources and the age-old agropastoral wisdom of food producers. Across the Sahara and the Nile River valley beginning in 6000 B.C.E., trade in cattle, donkeys, and goats built sophistication in raising animals for sale. Informal barter enabled breeders to diversify mammals and poultry and to select the best egg, meat, and milk producers.

Serious drought in 4000 B.C.E. forced farmers south from the Sahel grasslands into the tropical lake and river territory of the Ashanti and Yoruba. Homesteaders adapted to the bushmeat and wild food to the south in Mali. In addition to hunting the gazelle and oryx, seminomadic growers domesticated guinea fowl and grew African spinach, black-eyed peas, *fonio* (a type of millet), groundnuts (peanuts), millet, okra, pigeon peas, plantains, rice, sorghum, taro, and yams. Swiddens and applied animal and green manure upgraded soil fertility and halted erosion. Gradually, journeymen ventured into promising bazaars to the north to sell fruit, tubers, and vegetables. In 2000 B.C.E., enterprising Africans exported food plants across the Indian Ocean to semiarid Asian lands.

Precolonial Africa slowly realized its economic promise as a food provider for Europe and Asia. After 200 B.C.E., Roman buyers solved their national wheat crises by looking to Berbers in Numidia for emergency provender. To accommodate the grain trade, transporters established the Nubian river corridor from Aksum (Ethiopia) to Egypt and smaller overland routes that are still in use today. By 350

C.E., Red Sea ports developed international commerce so active that it fostered a vigorous pirate culture, which preyed on African wealth. The agricultural yield declined in the sixth century from drought, overfarming, and shifts in the Nile's annual overflow.

Early Commercial Success

From the late Middle Ages into the 1870s, waystations at Gao, Jenne, and Timbuktu controlled trans-Saharan traffic in cotton, salt, and kola nuts, a sacred item from the Cameroon and Gabon. As far south as the Congo River basin, West Africans valued the kola pod as a stimulant, diviner's tool, and holy offering at Igbo and Kanuri ancestor worship and funerals. Lagos, Nigeria, on the Atlantic coast, developed into the export center for the kola nut, valued as an aphrodisiac and in the drug industry to treat migraine and neuralgia. The growth of Islam spread demand for the nut for chewing by Muslims, to whom the Koran forbade alcohol. Conveyors traversing the Upper Niger and Upper Senegal by canoe accessed Moorish kola markets in Morocco and Tripoli.

At the end of the eighteenth century, Europeans viewed Africa as a vulnerable fortress of agricultural wealth. Much of the region's unique produce traveled by canoe fleet to anchorage on the Bight of Benin to provision the transatlantic slave trade. By shipping a taste of African food to slave markets in Europe and the Americas, enslavers unwittingly introduced the Dark Continent to world food commerce in bananas, eggplant, guinea squash, manioc, melons, sesame, and taro. In 1670, planters in Barbados and Jamaica established the first New World growth of Africa's green wealth.

The transport of Bengalese, blacks, and West Indians from Nova Scotia to Sierra Leone after 1792 enabled British investors to reap proceeds from the grain trade. Bambara, Fula, Hausa, Mandinka, Soso, Wolof, and Yoruba middlemen converged on Freetown to sell bananas, cashews, castor oil, cocoa, corn, eddoes, kola nuts, millet, okra, palm wine, peanuts, plantain, potatoes, rice, sweet potatoes, and yams. The group netted immediate profits from merchandizing arrowroot, coffee, cotton, ginger, honey, nutmeg, palm oil, and pepper. Upon gaining freedom, the West African nexus built on past success. In the 1820s,

Freetown flourished from connections with caravans arriving from the Sahel with food goods for global trade.

Farther south of the Congo estuary, British and German merchants exploited profits in kernel and palm oil. The Fang, who migrated from Cameroon into the forest zone, brokered the kola nut and palm oil trade as well as a complex business in guns, ivory, and slaves. As the predatory slave trade came to an end in the mid-1860s, cotton enjoyed a temporary boom along the Congo and Ubangi rivers because of the dearth of agriculture during the American Civil War.

A brisk business in cassava, coffee, gum, salt, and whitebait drew central Africans into a permanent symbiosis with free-spending European colonists. Because of lack of education and financial backing, blacks remained passive trade partners with white Europeans. The memoirs of Danish planter Karen Blixen, captured in the biographical film *Out of Africa* (1985), characterize the racial suppression and land theft from such indigenous laborers and coffee pickers as the stateless Kikuyu of Kenya.

Empire Builders

From Zanzibar, British, French, German, Indian, and U.S. exploiters who traded in cloves, copal, cotton, and gum erected export bans, quotas, and taxes that protected their interests. Arab merchants contributed to the international fervor by offering dates in exchange for salt and spices, which they transported down the Nile to Cairo and Khartoum. In Angola in the late 1860s, Brazilian and Portuguese moguls operated press gangs to grow coffee and sugar, both dependable plantation crops. By playing one Bantu faction against the other, empire builders perpetuated political intrigue as a method of spurring profits. Gunrunners and mercenaries fostered central Africa's reputation for thuggery and violence.

By the 1870s, the hegemony of Britain in Egypt, France in Algeria, and Afrikaner (Boer) and British settlers and railroad builders of South Africa south of the Kalahari absorbed greater control of precapitalist agricultural and pastoral produce. Western technology developed uses for corn as a source of fodder and oil, thereby displacing millet and sorghum as major cash crops. Europe an

dominance of wholesale mutton and wine exports from Cape Town and Natal ensured steady returns but little reward for Swazi and Zulu producers. Overall, British deal makers undersold African competitors and used sea power to tyrannize free trade.

In 1888, the Mozambique Company, a Portuguese investment in 60,000 square miles (155,000 square kilometers) of farmland, benefited from the export of a variety of East African goods—agave, cashews, cassava, copra, corn, fruit, peanuts (groundnuts), potatoes, rice, sugar, wax, and wheat. The promising stock appealed to importers in England, France, Germany, and North America. At the beginning of the twentieth century, the peanut offered more protein for the money than any other sustainable crop in Burkina Faso, Cameroon, Congo, Mali, Zambia, or Zimbabwe and advanced to millionaire status Alhassan Dantata, a Nigerian broker. Industrialization fostered trade in flour, liquor, meat, milk, peanuts, rice, and sugar in the 1920s until the Mozambique Company's downfall in 1941.

After World War II, the rise in urbanization increased demands for fresh produce and grain. The independence of sub-Saharan Africa in 1961 buoyed population so rapidly that the continent shifted from a cereal exporter to a food importer in just four decades. Employment figures into the late 1960s varied from 33 percent in Mombasa to 60 percent in Lusaka, an indication that large numbers of central Africans continued to rely on agriculture and pastoralism for their livelihood.

Into the 1990s, world economists awaited a green revolution of the magnitude of the Chinese and Southeast Asian food markets, which based their success on government investment in small farms. Contributing to Africa's rise as a trading partner, the dismantling of commercial restrictions and trade barriers allowed new competitors to export surplus goods. Meanwhile, African farmers offered testing grounds for genetically modified cotton and other crops in Burkina Faso, Egypt, Kenya, Morocco, Senegal, Tanzania, Zambia, and Zimbabwe.

In 2004, an increase in irrigation of rice lands in Cameroon, Kenya, Mauritania, and Niger augmented Africa's ability to compete against an entrenched Asian monopoly. By 2010, however, ecologists warned that African hydrology remained dangerously unpredictable in grain fields and pasturage along the Sahel and throughout northern and southern regions. To offset shortages, urban

horticulturalists planted high-value commodities—cucumbers, melons, peppers, strawberries, tomatoes—on marginal and peripheral land to heighten food security.

Recent Import-Export Trends

In 2011, global financiers noted that half of the world's ten fastest-growing economies—Algeria, Angola, Ghana, Mauritius, and Nigeria—were African. Since 2005, agricultural commerce had increased by 92 percent. More than Latin American and Pacific Rim buyers, both Canada and China courted small African markets in Burkina Faso, Ethiopia, and Malawi. To stabilize income, farmers replaced corn with drought-tolerant cassava. At the same time, Kenyan, Tanzanian, and Ugandan fishermen expanded their fresh water catch beyond Nile perch, the most seriously overharvested species; however, sabotaging regional efforts, health and pollution regulations passed by the European Union increased overhead, notably the cost of analyzing and inspecting seafood, maintaining quality control, removing pesticide residues, and tracing aflatoxins. U.S. border rejections of African foods tended toward the ridding of cereals, dried fruit, nuts, and vegetables of foreign matter and pathogens, especially botulism in canned goods.

Zambia, a landlocked entity once absorbed with the copper trade, hovers on the edge of enlarging subsistence farming into commerce in grain and diversified food staples appealing to urbanites. Like other poor countries—Kenya, Malawi, Tanzania, and Zimbabwe—Zambia has begun venturing into agribusiness by developing markets for beef, chicken, corn, eggs, fish, oil, pork, and vegetables. Government controls assist financiers in stabilizing income and protecting smallholders from the impacts of border regulations and unpredictable vicissitudes in weather and harvests.

The Islamic Food Council oversees imports of dairy products, frozen food, meat and poultry, and processed goods, such as beef and chicken from Brazil to African markets. To meet the demand for halal meat specified by Muslims, McDonalds, Nestlé, and Tesco have expanded their offerings, especially among affluent Muslims in Burkina Faso, Egypt, Guinea, Morocco, Niger, Senegal,

Somalia, and Tunisia.

Niche marketing nets a smaller exchange, such as the sale of American and Canadian mead—cyser, melomel, and metheglin—in Ethiopia and South Africa, where honey wine outsells grape wines. Despite a large Muslim population, Egypt markets Canadian ice wine, a dessert beverage pressed from frozen grapes. Exporters anticipated higher wine sales in Egypt, Morocco, and South Africa but reduced expectations for North Africa after the turmoil of the “Arab spring,” especially in Libya.

Farmers in Angola, like those in South Africa, produce enough subsistence crops to import beans, meat, and wine and to supply the rest of the world with bananas, beer, coffee, corn, cotton, fish, and sugarcane. On a higher economic level, Algeria tops demand for imported groceries, convenience and luxury foods for the hotel trade, diet foods, and grains and legumes, namely corn, lentils, peas, and wheat. The imports sustain Algeria’s main industries, which include food processing.

Nigeria, like Algeria, offers new markets for grapes, potatoes, processed food, and wheat flour for supermarkets and convenience stores. Nigerian farmers balance trade with their output of cocoa beans and sesame seeds. Generating a high employment rate, the country’s dynamic income can afford imports of baby food, beverages, and breakfast cereal.

In Accra, the financial heart of Ghana, a vibrant young population supports imports of beer, canned goods, fruit juice, ice cream, pastry, potato chips, powdered milk, sauces and seasonings, and wine. Outgoing shipments of cocoa beans and cocoa powder help satisfy the world demand for chocolate. Additional profit from arrowroot, cashews, coconuts, coffee, flour, pineapples, spice, and sweet potatoes enables a growing nation to flourish. Projections for future exports of tuna and other fish species raised in aquaculture increase interest in investments on Africa’s western coast.

At a faster rate, Mauritius, off the east coast, exerts the greatest claim on dairy products, eggs, fresh and frozen foods, lentils, oil, peas, pork, rice, and soybeans. From ports on the Indian Ocean, Mauritians deal in bananas, corn, potatoes, pulses, sugarcane, and tea. In a competitive environment, entrepreneurs intend to increase the Mauritian processing of seafood and to import luxury beef cuts to feed the tourist trade.

See also: African Diet and Cuisine, Sub-Saharan; Mozambique Company; Sierra Leone Company.

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[African Slave Diet](#)

In the late 1600s, West Africans favored a largely vegetarian diet augmented with dried fish, goat, iguana, marrow bones, poultry, and shark. Women cultivated small plots and created call-and-response field chants, the music of female cooperatives. Their kitchen gardens contained indigenous plants as well as imports.

Arabs introduced onions, rice, sorghum, sugarcane, and wheat to Sierra Leone. As late as 1455, the Senegalese grew kidney beans and sesame, but no barley, corn, rye, spelt, or vine crops. From India and Malaya through Madagascar and Kenya came the banana, cocoyam, and millet. Pineapples flourished at the Gold Coast. Angola and the Congo received fruit and vegetable strains from the Americas, and New World foods—chili peppers, dasheen, tomatoes—more than doubled supplies of staples. The hybrid cuisine included molasses beer to wash

down peanuts and pawpaws that the Portuguese first planted in Gambia, coconut palms and herbs that the explorers planted in Sierra Leone, and cassava and maize, imported by Portuguese traders around 1550 to Benin, Gambia, and Ghana. West African vendors propagated produce to sell to trading vessels at Cape Verde.

The new varieties supported a burgeoning African population despite losses to disease and enslavement. Transport by coffle overland or up to 30 to a canoe weakened the youngest and oldest of captives. Many died of tainted food in coastal barracoons (temporary barracks); others succumbed to contagious diseases or seasickness.

To maintain the vigor of Africans seized in the rain forest and to lessen mortality rates during the Middle Passage of transport to the New World, sea captains of British slave ships belonging to the South Sea Company and the London-based Royal African Company of England, a project begun by King William III, emulated the African diet. With ships' surgeons superintending food service, the mortality rate for transported slaves fell from as high as one-third to 13 percent by 1720.

A Familiar Diet

Key to health during slave transport were citrus fruits, coconut, millet bread, and medicinal herbs at meals, lime and water beverages throughout the day, kola nuts to combat thirst, and cleansings of the hold with vinegar. In hopes of suppressing slave revolts and hunger strikes, suppliers at Whydah on the Bight of Benin stocked corn, malagueta pepper, palm oil, and yams from Lower Guinea. Aboard the *Hannibal* in 1693, the galley crew cooked a ground slurry into porridge called *dabbadabb* (corn dumplings), varied three times a week by horse beans, which controlled the flux (dysentery). In 1707 at Cape Coast, Ghana, ships' cooks chose beans, corn, and rum as a wholesome and familiar diet. Above grain from farther west at El Mina, ships' mess staffs favored hominy, maize grown by the Fanti, red rice from Senegambia, and palm oil. The oil doubled as a skin emollient to heighten the appeal of captives to slave brokers. For the sick, the addition of sago, sugar, and wine to mutton soup roused some from malaise. Even serving an

African diet, over an eight-year period the Royal African Company lost more than one-quarter of its abductees, who were buried at sea before the ships reached the Chesapeake Bay.

The importation of African slaves to the Western Hemisphere introduced a third cuisine to Indian and Iberian fare in Colombia and Brazil. Additions altered the cooking styles and foodstuffs favored by Spanish colonists and saved lives. At Cartagena, Colombia, Jesuits stopped feeding slaves heavy cereal, eggs, and salt fish, a diet that killed off the weak who awaited sale to buyers at the docks. Other slaves, exhausted by dysentery and fevers, died on the trail during transport to Lima, Peru. From 1610 to 1650, religious worker Pedro Claver Corberó, the patron saint of slaves, visited slave hospitals and pens and treated dehydration, hunger, psychological shock, and scurvy in newcomers with brandy, bread, lemons, preserves, and sweets. At San Lazaro, he fed a special diet to lepers.

European opinions about the value of slaves changed as the fame of West African farmers and herders spread among planters, particularly in Bermuda, the first island to import black slaves. Along the coastal Carolinas, West African slaves rotated cattle pasturage with rice plantings, a method of restoring soil nitrates to improve the yield. To ensure working strength and stamina, overseers allotted a daily diet of 2,500 to 3,000 calories for each slave. African field hands cooked their own breakfast and dinner. For the afternoon meal, they rebelled against the feeding of slaves at a common trough like swine.

Typical fare in Maryland at the 2 P.M. serving included beans, buttermilk, cornmeal, molasses, and poke greens, a springtime delicacy valued as a tonic. Salt herring dominated meat servings along with discarded ham hocks, hog jowls and maw, chitterlings (animal intestines boiled in vinegar and water), fatback, organ meats, and pigs' feet. In New Orleans, crawfish and shrimp produced a rich, vivid Creole cuisine. Hunting, fishing, and trapping added carp, catfish, opossums, rabbits, turtles, and wild turkeys. When masters wanted to encourage harder work during planting and harvest, they augmented slave cuisine with food gifts and rum and whiskey from the big house.

Roots of Soul Food

To combat humiliation, coercion, and homesickness slaves craved food common to their home countries. They grew gourds and made ceramic colanders and dishes for slow-cooking rice, fanning baskets for winnowing, hoes for baking corn cakes, reed and sedge baskets for gathering root crops, and wood utensils for food cultivation and preparation of *cala* (sweet rice cakes), *jollof* (red rice), and ginger cake (molasses cookies). Women joined in the pounding of rice with mortars and pestles, a perpetuation of African sisterhood.

At Barbuda, agropastoralists staked out animals in vegetable plots and spread the drying manure to nourish plantings of dasheen, a South American famine food adaptable to many cooking needs. Amaranth and manioc leaves, collards, dasheen, mustard greens, and sorrel served as salads, nutrient-rich steamed side dishes, and extenders and thickeners of meat soup and stew. Island farmers boiled callaloo and yam, eddo, and plantain, which they flavored with salt and cayenne or red pepper. Around 1730, Virginia slaves raised watermelons to eat out of the hand like pome fruit and added African specialties to plantation menus.

Additional slave favorites—black-eyed and pigeon peas, broad beans, kola nuts, cowpeas, grits, millet, peanuts, okra, red rice—became Southern staples. Slaves adapted culinary styles and tastes from memory, including deep-fat frying of chicken and fish in peanut oil. Along the Guinea shore, cooks had anchored meals to root crops. In Cameroon, Ghana, and Nigeria, pureed potatoes and yams produced *fufu*, a basis for complex toppings and condiments that slaves duplicated in Brazil, Cuba, the Dominican Republic, and Puerto Rico. Diaspora dishes featured cornmeal for fish fries, grated ginger and pumpkin in soup, greens and mackerel in pepper pot, okra in gumbo, peas and rice in hoppin' John, peanuts in pralines, pepper in barbecue sauce, rice in meatball pilau, and later, kola nuts in Coca-Cola. At Monticello, Thomas Jefferson's Virginia home, slave farmers grew guinea corn (also called benne or sorghum), which they ate in broth, bread, greens, salads, and toasted as a soup topping.

Weekend markets held by slaves in Antigua, the Bahamas, Barbados, Jamaica, and St. John featured lima beans, cabbage, corn, ginger, mustard greens, and pumpkins. Savvy marketing raised cash to enhance the African American diet. Slaves from Nigeria protected their investment by digging cellars to protect root crops over the winter. Using their horticultural skills at fertilizing fields,

intercropping corn with peas, and weeding and topping plants, they enriched cotton, sugar, and tobacco tycoons.

See also: African Diet and Cuisine, Sub-Saharan; Language, Food; Manioc; Sierra Leone Company; Vinegar.

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Afterlife and Food

To allay the grief of death and bodily atrophy, mourners throughout history have supplied their dead with food and drinks. As early as 100,000 B.C.E., Neanderthal mourners supplied meals for the dead as nourishment for a netherworld. In contrast, the Sumerians envisioned a more austere afterlife lived in a dark, silent cave surrounded by dust. In a more uplifting philosophy, Japanese Shintoists and Koreans celebrating Chuseok offered favorite dishes to ancestors as a way of strengthening family ties.

Edible grave goods, such as the libations of milk and wine in Homer's *Odyssey* (800 B.C.E.) and Sophocles's *Antigone* (441 B.C.E.), were believed to have magical powers over the soul's destiny. Among Polynesians, the tasting of burial foods sealed the fate of the spirit, which, like the mythic Greek victim Persephone,

belonged forever to the land of the dead. To the Buddhist, Hindu, and Norse, the act of eating sustained the journeyer on the road to a final destination. According to the twentieth-century Hindu swami Prabhavananda, soul hunger readies the newly deceased for the great change from human to spirit. The newcomer fasts for three days without water or sleep until the King of Death extends welcome to the world beyond.

Food as Propitiation

In the Middle East, from around 4000 B.C.E., the gift of meals to the deceased ensured reciprocity—food in exchange for guidance and protection. At Gezer, an archaeological site between Jerusalem and Tel Aviv, Canaanites poked hollow feeding tubes into headstones to guide sustenance into the mouths of the dead. At Megiddo, north of Syria, Israelites delivered liquid sustenance to burial chambers through funnels. The custom came under attack in Ecclesiasticus 30:18 around 200 B.C.E., when poet Ben Sirach mocked the waste of meals piled on sepulchres. After the evolution of shivah, a consolatory meal for mourners, family members chose round foods—bagels, eggs, lentils—as symbols of the life cycle. Modern shivah gifts shift the emphasis from the inevitability of death to reminders of earthly sweetness, such as brownies, cheesecake, fruit, rugelach (nut rolls), and wine.

Egyptians protected agrarianism by burying the dead within sight of productive fields. Families stocked funeral chambers with plows and tools for growing grain and harvesting figs and dates. After opening the mouth of the deceased to ensure speech and eating, they assembled edible grave goods to feed the remains on a boat voyage to judgment in the afterlife. Coffin paintings glimpsed a full pantry of figs and lotus, duck and ibis, gazelle and oryx, flatbread, and seafood and jars of staples alongside cooking utensils and seats at a banquet table. To ensure a vigorous sex life, the painters added lettuce, an aphrodisiac.

A hieroglyphic list from after 2600 B.C.E. at Dahshur, south of Cairo, depicts uniformed maidservants delivering appealing meals to the dead on trays. On tomb walls, menus reminded servants in the afterlife of the foods enjoyed by the deceased. Drawings of foods allegedly shapeshifted into real servings. On the

fortieth day after the burial, survivors brought provisions to the cemetery. After prayers, the living distributed the edibles to the needy, a gesture propitiating favor from Horus, Maat, and Thoth, the judges of earthly behaviors.

Foods of Paradise

Scripture, sagas, and art since prehistory have illustrated visions of heavenly dining. Bas-relief and grave goods of Viking funerals depicted the dead warrior on a sea voyage. In his burial boat, provisioners placed a well-rounded diet—apples, beer, cress, hazelnuts, horse radish, mustard, oats, oxen, and wheat. Because Finns and Swedes believed that the dead remained on Earth until their bodies decayed completely, visitors offered grave foods to long-dead ancestors. Among Balto-Finns and the Sami, a ritual meal of animal hearts accompanied by magic incantations sung by a female chorus strengthened the resolve of the journeyer. As described in the Finnish epic *Kalevala* (1881), the ceremony concluded with a banquet, at which a fortune-teller predicted the destiny of each mourner.

In some societies, mock foods take the place of real dishes. In 141 B.C.E., clay models of sheep and pigs suggest meaty meals for the Chinese Emperor Jing of the Han dynasty. Around 1450 C.E., Chinese artists in Shaanxi Province made model foodstuffs on ceremonial plates. The offering of fish, goat, goose, pork, and rabbit and fresh servings of peaches, persimmons, pomegranates, steamed bread, and water chestnuts represented the common diet of the period.

World religions have typically endowed funereal meals with power and sanctity. Even though Jews believed that the dead had no need of sustenance, the Kabbala, mystical writings compiled between 100 and 1200 C.E., pictured a symbolic meal of fish, meat, and wine served in the Garden of Eden. The divine food contained “sparks of holiness,” the magical power that elevated the spirit to heaven.

Pagan Rites

The living worldwide went to great lengths to honor the elite dead by accepting

the cost of sacrifice. After 668 B.C.E., Ashurbanipal, the Assyrian monarch at Nineveh, acknowledged his piety with an inscription crediting him with reviving old customs of libations and meals for royal spirits. In a similar gesture to the privileged class, the Aztec ensured convivial meals of familiar foods by sacrificing cooks to accompany the noble dead to the next world. Among the Lenni Lenape of North America, women pounded corn and made unsalted loaves in outdoor ovens. Zoroastrian women spread communal food offerings to the deceased on *sufra*s (funeral cloths).

For Amerindians, tobacco generated visual prayers for the dead. Plains and Pacific Coast Indians sprinkled *kinni-kinnick* (herbed tobacco) or unadulterated tobacco over remains as a holy gift and propitiation of the gods while the spirit crossed over the star path from Earth to sky. The Winnebago extended the tobacco pipe to the deceased as though including them in the feasting and pleasures. At an Algonquin funeral in October 1647 in Nonanetum, Massachusetts, the corpse bore the calumet (pipe) of peace during his journey as a gesture of nonviolence to the spirit world.

African religions favored killing a goat or ox at the burial. According to the pastoral Nguni of southern Africa around 1400 C.E., the slaughtered beast made two journeys—following the deceased to the netherworld and, on Earth, feeding the bereaved who remained behind. On a more upbeat note, the Arawak of the Carib be an anticipated joy in Coyaba, a land of dancing and endless banquets, a concept they shared with the Celts. The Inca interred their dead sitting upright amid pots of food, symbols of abundance. As proof that the afterlife liberated the spirit from want, the Papago and Pima pictured their ancestors living free from hunger and thirst.

Islamic Funeral Food

Muslims observed the same sharing of food and celebration as a form of friendship and condolence. Unlike the ancient Jews, Egyptians, Greeks, Japanese, and Chinese, Islamic families directed gift meals toward the community rather than to the deceased. In the style of Cushites, the bereaved ended the day with a feast, which required slaughter of camels, cattle, and sheep to feed a large

gathering. As a form of ritual almsgiving, one of the Five Pillars of Muslim worship, family mourners shared the bounty with children, the hungry, neighbors, and strangers.

Meanwhile, the Muslim dead earned their rewards in paradise, where sumptuous tables bore a perpetual supply of food and drink served on gold and silver tableware by handsome young men and women. The Koran (650 C.E.) specified the luxuries awaiting those who died in a state of grace. Lush gated gardens, angels, and streams of honey, milk, water, and wine surrounded the righteous, who won favor with God by eating only halal (permissible) food on Earth. Permeating the air were the appetizing scents of camphor, ginger, and musk and the mist of fountains.

Uniting Past and Present

Food today maintains its role as an element of life's goodness, from the Inuit vision of a warm land of plenty to the beneficent comforts of the Baha'i and Cree "good land." For Wiccans, dancing, singing, and partaking of cake and wine honor the soul as it makes its way to Summerland. Practitioners of Santeria, a pantheistic faith that originated in West Africa, offer sacrifices to spirits to maintain a reciprocal relationship with the world beyond. By feeding the deceased with artistic patterns of cornmeal and the blood of sacrificial chickens and goats, the living receive health and shielding from harm.

The peasant holiday of Día de los Muertos (Day of the Dead), celebrated on November 1 and 2, involves Roman Catholics in Ecuador, Guatemala, Mexico, and the Philippines as well as Arizona and California. In addition to candles and marigold petals, mourners honor their deceased with photographs, aniseed bread, tamales, and liquor. Like the ancient Maya, communities bury sustenance to feed the spirits on their way to the afterlife, which they entered through caves to eat wild birds, which were no longer taboo. Home altars bear heaps of *atole*, cocoa, egg bread, fruit, peanuts, sugarcane, tortillas, and turkey mole. A folk art confection introduced during the colonial period, sugar skulls release the sweetness that death fails to conquer. All-night vigils bring celebrants together in an effort to direct souls home again.

See also: Breadfruit; Jerky; Pasta.

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Agribusiness

The totality of buying and selling involved in bringing food crops to the table, agribusiness forms a vast network of farmers and herders, financiers, equipment manufacturers, seed suppliers, livestock marketers, and food processors, advertisers, and distributors. In the mid-1800s, the mechanization of plowing by Cyrus McCormick and John Deere preceded a U.S. refrigerated rail network that sped grain, citrus fruit, potatoes, and meat to emerging processors, notably, Armour, Campbell's, Del Monte, Heinz, and Swift. After establishment of the U.S. Department of Agriculture in 1862 and the building of land grant colleges, contract farming replaced subsistence farms with more advantageous methods of sharing risk.

An American model, contract poultry began in 1929 at the collapse of post-Civil War sharecropping and tenancy. Rural sociologist Rupert Vance surveyed agribusiness at the onset of the Great Depression when Georgia cotton growers abandoned their traditional monocrop for chicken coops. Educated by the federal home demonstration service and guided by county agents, poultry growers supported a food industry based on hatcheries, feed mills, and chicken-processing plants.

During World War II, demand for eggs and meat solidified the fate of the American small farm with reciprocal contracts and indebtedness to the poultry speculator. In 1955, John H. Davis, a Harvard professor of agriculture and marketing, created the term *agribusiness* to describe the evolution of subsistence farming into a business complex.

Efforts to curb corporate power mongering involved growers as well as laborers and truckers. In 1960, journalist Edward R. Murrow presented the television documentary *Harvest of Shame*, a graphic view of the bottom rung of the agrifood hierarchy. In the 1970s, César Chávez and Dolores Huerta organized the United Farm Workers, the first effort of migrant labor to battle U.S. exploitation of the disempowered. The set-to between union members and illegal immigrant strikebreakers revealed to consumers the cost in human terms of cheap grapes and lettuce from corporate farms.

To supply the growing demand for convenience foods, such as powdered eggs and ready-to-fry chicken, transnational corporations in the 1980s stepped up involvement in world agriculture. The era's low commodity prices spurred land speculation and rising property taxes, which strapped family farms, ranches, and rural communities. A complex interaction, agribusiness coordinated the efforts of genetic seed modification to increase yields and food transportability and the addition of corn ethanol and palm oil to tractor fuels to stretch the costly supply of fossil energy. Entrepreneurs and seed patenters targeted fruit, vegetables, and seafood from Third World producers for financial exploitation. To the dismay of smallholders, corporate farming placed huge markets under the control of micromanagers and biotechnologists. The top earners for agrifood—bananas, cocoa, coffee, grain, oil—remained chiefly in the purview of a handful of companies, including Bunge, Cargill, Carrefour, ConAgra, Danone, Dole, General Foods, Huanong, Kraft, Nabisco, Nestlé, Parmalat, Ralston-Purina, and Tesco.

In 2007, Brazil flexed its agrarian muscle as an emerging producer of citrus fruit, corn, cotton, soybeans, and sugar, and cattle, pork, and poultry. Rated third in corporate clout behind China and India, Brazil competed against China's food moguls at a vulnerable point in food security following the adulteration of Chinese baby food, soy products, and pet food with melamine. The mounting threat of farm takeovers increased following the formulation of international food purity and safety standards. Costs lay beyond the grasp of smallholders,

such as producers of leafy greens, Mexican tomatoes, and organic grapes and strawberries.

Beside purity concerns, a variety of global issues impact agribusiness and agrofinance today, including control of pesticide-resistant insects, buyout attempts between European food giants, and the growing power of women in microfinance and corporate farming. Layered situations create a domino effect: The Australian investment outlook remains cautiously optimistic, depending on the U.S. settlement of its debt ceiling and Indonesia's postcyclone cattle imports from Queensland.

The collapse of Soviet Communism allowed some nations to regain traction in the world food market. In July 2011, farmers formed a customs union of Belarus, Kazakhstan, and Russia. Simultaneously, after the "Arab spring" of 2011, Egypt, the most populous Arab nation and a major player in the wheat market, fielded a record crop. With political control still unpredictable and the Middle East teetering on upheaval, farmers projected growth into 2015 in dairying and the cultivation of beets, which reduce the natural salinity of Egyptian fields.

See also: Commodity Regulation; Farm Subsidies and Government Agricultural Programs; Genetically Modified Food; Green house Horticulture; Hanna, Gordie C.

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Agriculture

A basis for civilization, agrarianism tied the support of a clan or tribe to the output of herding, orchardry, seed and tuber planting, and viticulture (the cultivation of grapes), all sources of portable trade commodities. During the Neolithic revolution around 12,000 B.C.E., hunter-gatherers embraced a settled life by planting wild einkorn wheat, an annual hulled grain that thrived at the western end of the Fertile Crescent. Threshers collected the hulled seeds to roast at campfires into digestible, satisfying grains. Low yielding, but protein rich, einkorn wheat cooked into a low-fiber gruel suitable for invalid and weaning meals.

After the establishment of Abu Hureyra and Mureybit, east of Aleppo in western Mesopotamia (Syria), in 11,050 B.C.E., a thousand-year drought forced early Palestinians to irrigate plantings of comestibles and water sheep herds. To feed the most people, workers selected animal and grain traits, particularly dependable milking from cows and sheep and sturdy grain heads on slender stalks for the largest crop. Growers planted seeds in fertile fields and cached harvests. In the Neolithic Levant, Natufian villagers fenced out gazelles and broadcast seeds in open spots among wild almond, pistachio, and plum groves and berry bushes. Because of the ease of threshing wild wheat stands growing 36 inches (91 centimeters) tall, in three weeks, a clan could garner a year's supply of grain.

As farms thrived, population density rose from one to 15 persons per square mile. To feed all, protofarmers across the east-west Fertile Crescent naturalized self-pollinating, early-maturing founder crops—barley, bitter vetch, chickpeas, einkorn and emmer wheat, flax, lentils, and peas. Blacksmiths tempered blades for cutting grain; stonemasons nested grinding stones and mortars and pestles for reducing grain into a fine grist for flatbread and beer. Cultivation in Jordan, North Africa, and the Taurus and Zagros valleys of Turkey spread across the Balkans to Serbia, the Danube River delta, the mouth of the Rhine as far as northern Italy and Valencia, Spain, and north to proto-Celtic enclaves.

Grain-Based Diet

The acceptance of grain as a daily staple paralleled the cultivation of wild figs and the domestication of dogs, goats, pigs, and sheep for fiber, meat, and milk. In southeastern Turkey in 9000 B.C.E. and Jericho in 8000 B.C.E., innovations of Neolithic, or New Stone Age, cuisine shifted focus from a eat-only diet to cooked legumes. Herders in India raised zebu for meat and evolved dairy foods from cows. Cooks chose from barley, corn, millet, oats, rice, sorghum, and wheat the appropriate grains for bread, flour, noodles, and pasta. In the Chihuahua Desert on the Tex-Mex border around 7500 B.C.E., pleo-Indian farmers hunted less and consumed more domesticated cheese, grain, meat, and milk.

From this era, agriculture evolved formalized methods and strategies. Syrian agrarianism flourished at Damascus, where planned cultivation rapidly replaced the more rigorous and hazardous hunting-and-gathering lifestyle. In Papua, practical farmers raised root crops and sugarcane alongside pigs, useful recyclers of green wastes. The seeding of barley and wheat spread to the Aegean isles, Egypt, the Harappan culture of the Indus Valley, Kurdistan, and Pakistan in 7000 B.C.E. and to Argissa, Greece, Germany, Iberia, and Crete in 6000 B.C.E. India's farmers domesticated the jujube (date) for drying and pickling, trained elephants for heavy lifting, and penned chickens to supply eggs and meat. Harappans also drained bogs and diverted sewage from irrigation water. Growers gained sophistication at seed selection by choosing emmer wheat and barley for cultivation in clay and marl soils. Meanwhile, in the Far East, Chinese and Indonesian crop tenders developed a more integrated diet of adzuki beans, rice, soy, and taro as accompaniments to chicken and the fish they netted from rivers. The broad-based diet fueled a population explosion.

At the same time that proto-Americans were reaping arrowroot, corn, and manioc around 5500 B.C.E., Irish growers at Céide Fields became the first to raze forests and surround permanent croplands with rock walls. Agrarianism reached Macedonia, Thessaly, and Thrace after 5200 B.C.E., when food control began to generate exciting possibilities. Sumerians, the empire builders at the Tigris and Euphrates delta, bred cattle and sheep and irrigated fields after 5000 B.C.E. The advances coincided with the growing of oranges in the Indus Valley, where farmers gradually added apples, barley, cotton, grapes, mangos, peas, plums, rice, and sesame seeds to their harvests and butter and cheese from their herds. In the Ukraine in about 4500 B.C.E., herders tamed the horse, a major contribution to

streamlined sod breaking.

Agrarianism and Civilization

The improvement of nutrition and farm yield aided cities in recruiting and maintaining standing armies on grain and vegetable surpluses. The nourishment of soldiers allowed the Egyptians to found a 3,000-year series of dynasties, to advance in architecture and technology, and to triple their territory through conquest via a standing army fed by farms along the Nile. The Sumerians reached a height of urbanization at Ur, where farmers produced enough food crops to sustain the world's first bureaucracy. The city employed granary workers and accountants, overseers, and harvest foremen, who supervised the harnessing of onagers and oxen to plows. Also around 4000 B.C.E., the Chinese tamed the water buffalo, Arabians herded dromedaries, and Eurasians bred the dray horse. Simultaneously, beekeeping produced a new dimension in raising flowering plants to yield nectar for honey and wax.

In this same period, the Andean Inca terraced vegetable gardens to produce beans, coca, pepper, potatoes, squash, and tomatoes. For meat, they stocked their farms with alpacas, guinea pigs, and llamas. Farther north, Central Americans turned cocoa into a dominant crop and domesticated the wild turkey, a bird found only in the Western Hemisphere. Northeastern Americans made their own agricultural strides by grooming maple groves for sugar sap collection and harvesting pecans, strawberries, sunflowers, wild grapes, and wild rice, a specialty of the Anishinabe, Menominee, Ojibwa, and Winnebago of the Great Lakes region.



A mural from the tomb of Sennedjem, an ancient Egyptian artisan of the Nineteenth Dynasty (ca. 1298-1187 B.C.E.), depicts the harvesting of wheat along the banks of the Nile. Egyptian civilization was one of the first to practice agriculture on a large scale. (*De Agostini/ Getty Images*)

Not until 3,300 B.C.E., on the slopes of the Alps, did northeastern Europeans evolve a three-grain cultivation of barley and einkorn and emmer wheat. In another burst of agrarian innovation, the mid-fourth millennium B.C.E. saw rapid improvements in agricultural technology, followed by formal poultry farming in India and Pakistan and the domestication of ducks, geese, and rock pigeons in China. The ard or frame plow replaced the dibble, a simple pointed digging stick. The buffalo, camel, and donkey took the lead in carving furrows and trampling weeds in moist subsoil. British and Scandinavian plowmen organized their efforts by heaping dislodged stones in clearance cairns, evidence of farm ownership and cyclical tillage of land.

The taming of more animals for proto-ranching required securing winter fodder and raising and trading excess stock for slaughter. In Russia in 3000 B.C.E., reindeer herds provided both milk and meat as well as hides for clothing and shelters. In Egypt, the goose became a specialty food and layer of protein-rich eggs. By 2500 B.C.E., central Asians had added both the Bactrian camel and the yak

to agrarian investments. Southeast Asians in Borneo, Burma, and Java raised two distinct relatives of oxen, the banteng and gayal. Adventurers later relayed the animals to Arnhem Land in northern Australia to procreate feral herds.

In 161 B.C.E., Romans evaded the Lex Fannia, an anti-gluttony law, by colonizing rabbits and castrating roosters to produce capons, a meatier form of poultry. The *latifundia* (plantation) employed slave labor and tenant farming to grow edibles for a densely populated empire. Artisanal training readied specialized laborers to press olive oil and ferment *garum* (fish pickle) and wine. All three products traveled by two-wheeled cart to ports for loading on cargo vessels bound for Marseilles, Iberia, North Africa, Egypt, and the Middle East.

Medieval Farming

The Middle Ages advanced less labor-intensive watering systems employing dams and weirs, norias, waterwheels, windmills, and shadoofs, the pole-and-dipper method that irrigated vegetable plots along the Nile, the world's original ecosystem. Roman texts reveal the refinements of the classical era, in which vineyards and orchards coordinated with apiculture and the gathering of honey and beeswax for use and export.

Agroecologist Jia Sixie, a governor in Shandong Province, compiled an indexed guide to progressive Chinese farming, *Qimin Yaoshu* (Skills for Peasants, 534 C.E.), one of the world's oldest agricultural monographs. Out of pity for poor yeomen, Jia traveled to Hebei, Henan, and Shanxi provinces to record up-to-date methods of soil cultivation and list 86 varieties of millet according to insect and wind resistance and early ripening. He took notes on monoculture for export, crop rotation, green manures, caching, animal husbandry, and selective breeding. He also summarized yam cultivation and cited the leading farm treatises of his day on orchardry, thinning bottle gourds, drying and pickling pomegranates, fermenting soybeans, and raising fish in rice paddies. Jia divided rice into mucilaginous and dry types. Among 31 common vegetables, he focused on calabashes, cucumbers, dropwort (meadowsweet), eggplant, garlic and onion, Japanese pepper, mallow, muskmelon, mustard, radish, and rutabagas. For grafting pears onto crab apple trees, he recommended an upward limb thrust to

allow orchards to thrive near buildings. His text, which recommended methods of selecting and cooking farm produce and making vinegar and yogurt, remained in print for six centuries in Chinese and Japanese editions.

In the tropics and subtropics, crop rotation and swidden agriculture reformed food production. The Olmec and Maya and the slaves of the British Caribbean torched underbrush, roots and stumps, and diseased vegetation as a quick method of denuding cropland. Seedlings, slips, and suckers from earlier swiddens at least two years old supplied transplants of select species, such as coconut palms or paper mulberry, which growers fertilized with human excrement and livestock manure.

Farmers modernized soil preparation with the invention of the horse shoe and halters for draft horses and the moldboard plow for inverting weedy clods and exposing the roots to the sun. A heavier metal-faced plow crafted around 600 C.E. improved yield and fostered a population spurt.

Exchanges and Improvements

The greatest revolution in farming occurred with the Spanish exploration of the New World after 1492. From transatlantic voyagers, European growers acquired a treasure of plant species—corn, peppers, potatoes, red beans, and sunflower oil and the titillating flavors of avocados, bergamot, blueberries, cashews, cocoa, cranberries, guavas, mangos, papayas, pecans, persimmons, pineapple, and tarragon. Exotic crops invigorated the diet with the mouthfeel and taste sensations of indigenous products. The Western Hemisphere received its share of the Columbian Exchange in coffee, spices, sugarcane, and wheat.

For the New World farmer, the arrival of the horse and hunting hound offered methods of pulling plows and travois (skin drags). In the temperate zone around 1600, rabbitries became a source of delectable fryers and roasters and older stock for stewing. In the Canadian Maritimes, marshland mixed agriculture increased pasturage and truck farming along with fish processing for export.

In 1701, English agronomist Jethro Tull invented a seed drill—a hopper and cylinder that turned against a spring-loaded tongue to sow pasture grass. By directing beans and peas through grooves into a funnel, the device regulated

distribution over three rows at a time, leaving space for tillage. Tull promoted the use of horses to replace oxen as draft animals and adapted his drill for the planting of potatoes and turnips, two popular tubers of his era. He engineered a four-coultured disk plow and a horse-drawn hoe to pulverize dirt clods to release minerals into wheat and forage plants. In *The New Horse-Hoeing Husbandry* (1731), Tull proposed contour plowing to terrace the soil, retain water runoff, and limit soil erosion. A century later, the introduction of steam plows by English inventor John Fowler reduced demand for draft animals and the need to grow fodder and straw for stalls.

North American Innovations

During the agrarian phase of North American development, farmers broke more virgin land than ever in the course of history. Over half the population of Canada and the United States worked on farms. On ranches, the hybridization of the buffalo and cow in 1749 encouraged ranchers to breed hardy stock capable of weathering droughts and blizzards. For citrus and vegetable growers in Orange County, California, support of railways in the nineteenth century boosted profits from the rapid distribution of perishable lemons and oranges, apricots, beets, celery, grapes, lima beans, and walnuts.

An independent U.S. Bureau of Agriculture, established in 1862, salvaged heritage seeds and preserved plants and seeds. Agents purchased seeds from foreign countries and compiled statistics concerning the terroir in which crops grew best and under what climatic conditions. The new department took shape at an agrarian flash point—the death of slavery and the Southern plantation system, the expansion of green house propagation, and the birth of frontier farms, orchards, vineyards, and cattle and sheep ranches. As former slaves migrated from the Carolinas and Georgia to farm the rich silt of the lower Mississippi River valley, agronomists debated the use of powdered and liquid fertilizers to revitalize depleted fields, a concept still new to farmers. The staff of 30 bureau scientists analyzed soil, introduced resilient varieties and livestock, tested farm implements, answered citizens' questions, and forecast farm needs.

North and South American ranching methods allowed calves to forage the

grassland outside of villages and settlements, particularly in Argentina. Science and technology assisted the postwar agrarians with drought and other cyclical obstacles. In Hawaii in 1861, King Kamehameha IV imported honeybees, experimented with new hybrid rice seed, and added a waterworks to ensure even distribution of fresh water. On the truck farms of Dayton, Nevada, horticulturists stored water in ponds and underground and earned top dollar for fresh vegetables sold in railroad camps and mining communities. In New Mexico, the construction of log flumes channeled irrigation water to cornfields, enriching the San Juan River valley from the sale of forage and stock. Russian Mennonites purchased 100,000 acres (405,000 hectares) around Topeka and initiated the planting of “Turkey Red” wheat, the hardy winter variety that turned Kansas into America’s breadbasket.

Abraham Lincoln’s progressivism fostered both livestock and farming throughout the rapidly growing West. On July 2, 1862, congressional ratification of the Morrill Land Grant Act authorized federal distribution of 17.4 million acres (7.0 million hectares) of public land at the prorated acreage of 30,000 (12,150 hectares) per legislator. The Civil War threatened grain farming by raising the price of implements and seed and by reducing the acreage farmable by cash-strapped smallholders. The decimation of South Carolina and Louisiana rice plantations shifted cultivation to California’s Sacramento River valley, the nation’s new rice bowl, propagated by immigrants from Guangdong Province, China. Wisconsin farmers experimented with alfalfa, a digestible fiber for stock; the Dakotas and Minnesota dominated trade in flaxseed, a source of linseed oil. Sonoma, California, produced hops for brewing beer. By 1879, as corn developed into the world’s top feed grain, American yields reached 1 million bushels. After passage of the Dominion Land Act of 1872 in Canada, North America led the world in the increase of alfalfa, canola, oats, and wheat harvests. In 1873, U.S. corn cultivation expanded to more than 34 million acres (13.8 million hectares).

During the Indian Wars, the U.S. military’s need for beef increased the profitability for stockmen and homesteaders. On the northern Texas border at Guthrie in 1870, Samuel Burk Burnett of the Four Sixes Ranch interbred longhorns with Durhams and Herefords. Captain Richard King of Corpus Christi bought up the King Ranch, which grew to 860,000 acres (348,000 hectares), the world’s largest ranch. Burnett and King plotted drives to East Coast cities, where

hotels and restaurants increased the demand for beef.

Large-Scale Farming

Ambitious Oregon ranchers took advantage of the Desert Land Act, passed on March 3, 1877, to promote the irrigation and cultivation of 640-acre (260-hectare) plots of semiarid public land at a cost of \$1.25 per acre (\$3.09 per hectare). Agronomists in Nevada guarded turf and waterways as the life-or-death resources to support grasslands and livestock. The fencing of free prairies led to protracted range wars over independent foraging rights. Overgrazing plus a disastrous blizzard in 1886 drove some ranchers out of business and forced others to diversify. Those reduced to subsistence farming gained a labor advantage in 1892 with the advent of the gasoline-powered tractor.

With the Great Plains of Canada and the United States thoroughly settled by 1920, agronomists heightened yields by breeding more productive animal varieties, developing cattle vaccines, and growing disease-resistant plant species, notably, durum and marquis wheat. Farm cooperatives lowered costs from the purchase of balers and pickers. Colombia and Panama developed resilient sheep herds; Saskatchewan produced half of Canada's wheat. In 1926, hybrid corn seed suited individual varieties to climate and soil. Long-distance refrigerated trucking linked consumers with dairy and vegetable perishables. By 1930, Americans exported \$2 billion per year in farm goods. Pre-World War II collaboration with South American agronomists enhanced diversity throughout the hemisphere.

Exigencies of World War II in Europe and the Pacific forced American and Europe an farmers to develop new technologies, such as the harvesting of kelp as a military foodstuff. Enhancing the demand for contract staples, food stamps and the 1946 National School Lunch Act guaranteed markets for agrarian commerce. Keeping pace with conventional farming, such innovations as the growing of mussels, oysters, and salmon by New Zealand aquaculturists broadened the definition of farming to include hydroponics and controlled pisciculture.

With liquid fertilizers, chelated plant nutrients, herbicides, and pesticides, agriculture boosted yields into the 1970s. The quick-freezing of edibles for transportation on cargo planes and trains maintained affordability of produce and

citrus juices in inner cities and increased the outsourcing of surplus crops to the Soviet Union, Jamaica, the Dominican Republic, and other parts of Latin America. In the 1990s, charitable outreaches diverted infant formula and dried milk to the needy in developing nations.

Tomorrow's Food Supply

By the twenty-first century, farming dynamics raised controversies about world food security. Advanced farming strategies—selective breeding, satellite weather tracking, biotech crops and livestock, Internet agriculture courses, and patented seeds—augmented yields. China, the world's most populous nation, enhanced traditional farm crops by harvesting 33.7 million tons (30.6 million metric tons) of fish from aquaculture in 2004. Mariculture added algae, cobia, oysters, prawns, and seaweed to exports in Australia, Chile, China, France, Ireland, Italy, Japan, Mexico, and Norway. Theories of “sea ranching” proposed controlled methods of salvaging endangered species of seafood. At the same time, global warming foretold flooding and disastrous storms that displaced topsoil and destroyed family farms, pastures, and orchards.

Other issues infringed on the traditional farming model. Monoculture threatened food diversity by earmarking large parcels of farmland for the top staples—corn, soybeans, and wheat. Hive beetles and viruses reduced bee colonies. Government aid to farmers reached 9 percent in the United States and 4 percent in Australia, compared with 52 percent in Korea and 61 percent in Norway, the most subsidized national agriculture. Surprisingly, global crop choices remained similar to those of Neolithic farms. Cereals and pulses far outranked vegetables and tubers in importance; grains outpaced sugar sources, with Saskatchewan producing 77 percent of the world's poultry feed. Dairy products held first place, preceding sales of fruit and meat.

Ironically, the dominance of agribusiness slumped in the public's estimation following revelations of unjust farm subsidies, burgeoning green house gases, and pollution of groundwater with pesticides, veterinary antibiotics, and chemical fertilizers. Grassroots actions by locavores reclaimed the farmers' market and popularized heirloom varieties and Slow Food, a resurgence in artisanal cheeses,

eggs from free-range hens, herb blends, pastries, and wines. Health warnings about the cumulative effects of additives and dyes in processed foods called for a re-evaluation of purity standards, the regulations begun in the Middle Ages.

On the eve of fossil fuel collapse, venturesome farmers increased their incomes by jettisoning scientific wizardry and embracing organic produce, intercropping, and biomass crops—corn, fruit wood, sorghum, palm, and sugarcane, the sources of ethanol and hybrid fuels. In a model of agrarian cooperation, Australian farmers upped farm sustainability to 88 percent and bolstered environmental protection by 75 percent. Nonetheless, Greenpeace foresaw abandonment of capitalistic excesses as the only means of restoring healthful food to local markets. Irish agrarians predicted that agrifood was the “sleeping giant” of investment potential. International financiers looked to microponics (backyard farming) and distribution of farm surpluses among the have-not nations as two means of reducing poverty and elevating wellness worldwide.

In 2011, the United Nations (UN) envisioned restored interest in the food supply, especially in Ghana, Rwanda, and Tanzania. According to the UN Food and Agriculture Organization, Africa may hold the key to world food security. Forecasts of the continent’s role as food grower for the world pictured a profound shift toward modernization and a reversal of cyclical famine in Ethiopia, Somalia, and Sudan, where desertification and drought have defeated field agriculture. According to population projections for 2050, the 986 million people in industrialized nations will face huge political and economic challenges in raising food security for the 7.987 billion who will populate developing countries, the locales that generate an average hunger rate of 6 percent.

The UN set as an interim goal the halving of hunger by 2015 and the reduction of child mortality by 66.6 percent. By 2030, poor nations will have to engineer a 20 percent boost in arable land and installation of aquaponics in Third World deserts, notably, sub-Saharan Africa. Desertification, erosion, salinization, trade deficits, and water shortages will worsen, as will the undernourishment of the most vulnerable. Hopeful indicators in Benin, Burkina Faso, Ghana, Mali, Mauritania, and Nigeria foretell rapid increases in the cultivation of cereals, roots, and tubers as the underclasses raise self-sufficiency.

See also: Agribusiness; Aquaponics; Einkorn Wheat; Emmer Wheat; Fertile

Crescent Diet and Food Trade; Green house Horticulture; Irrigation; Monoculture; New World Commodities; Organic Foods; Sicilian Diet and Cuisine; Slow Food; Swiddens; Vegetarianism.

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Agroecology

By allying scientific knowledge of natural systems with farming, herding, and orchardry methods, agroecology integrates food production into a sustainable whole. Unlike dogmatic philosophies of monoculture, organic farming, and technological harvesting, agroecology balances all methods to ensure a stable, equitable distribution of food worldwide without damaging nature.

The task of agroecologists begins with the management of both traditional and innovative approaches within the land and water resources of communities, such as the use of farmer's markets and urban vegetable beds to supply Cubans in Havana. Among modern-day priorities, specialists name halting the replanting of Amazonian rain forests with herd pasturage, diverting fresh water to drought-stricken regions of northeastern Africa, overcoming poverty in Guatemala and Haiti with cheaper cereals and grains, engineering new power sources to replace nonrenewable fossil fuels, and preventing China's industrial complex from poisoning air, earth, and waterways with chemicals and heavy metals.

Since 1911, farming pioneers have analyzed the best locales and methods for

saving seeds and growing crops. In 1961, 34 countries convened the Organisation of Economic Cooperation and Development (OECD) as a means of stimulating world trade and global prosperity. Inspired by the Marshall Plan, which rebuilt Europe after World War II, the consortium defined areas of concern, particularly maximizing coffee harvests in India, Indonesia, and Vietnam and stemming bribery and graft at distribution points, a major source of starvation in Afghanistan, Bosnia, Ethiopia, Rwanda, Somalia, and Sudan. Jolting members to action, conservationist Rachel Carson's book *Silent Spring* (1962) warned that humankind had a limited time to reverse the damage that industrial agriculture did to the environment.

The OECD resolved to raise standards of health and nutrition by furthering democratic market economies. Target areas included the least developed areas of Africa, Eastern Europe, Indonesia, the Middle East, and much of Central and South America. Methods began with educating farmers on rotating crops for maximum food diversity and planting legumes under fruit trees to upgrade soil fertility. Educators taught smallholders to make full use of land by interplanting lentils with sorghum and by developing complementary herding and horticulture—for example, raising chickens and guinea fowl alongside melon patches as a natural pest control. Demonstrators presented methods of mulching and nutrient recycling, soil aeration, and no-till field preparation to lower costs of producing corn and soybeans. Geneticists proposed new sources of rice seeds for farms in Bohol, the Philippines, and Ghats, India.

Early in the twenty-first century, rural sociologist Frederick H. Buttel, a professor at Cornell University and editor of *Society and Natural Resources*, promoted agricultural activism as a means of shielding the environment while ensuring fair distribution of the world's food supply. By applying ethical and political fairness to modern agriculture, his disciples intend to monitor population growth and the use of air, land, and water to satisfy the needs of remote indigenous peoples. The task of feeding the world's people requires cooperation among specialties—agronomy, biology, demography, ethics, and geochemistry. The immediate goal is to maintain the well-being of nature, animal and human populations, and soil.

See also: Aquaponics; Ecofeminism.

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Airlifts, Food

Since the advent of long-range air transportation in the 1920s, the deployment of cargo planes and helicopters to world catastrophes has relieved hunger in situations approaching starvation and genocide.

In April 1942, the U.S. Air Force, at the command of President Franklin Delano Roosevelt, launched air relief over the eastern Himalayas to supply Chiang Kai-shek's troops. After the Japanese halted supply trains along the Burma Road, American planes began a 43-month rescue operation delivering 650,000 tons (590,000 metric tons) of goods over 500 miles (800 kilometers) from Assam, India, to Chinese Nationalists in Yunnan Province. Navigating the perils of mountain updrafts, ice, and bombing and strafing by the Japanese, the cargo planes ferried weapons, medical supplies to treat dysentery and malaria, tons of beer, cigarettes, iodine for water purification, and C rations in tins. Each tin contained biscuits, chocolate, instant coffee, and sugar cubes.

Berlin Airlift

In the aftermath of World War II, the Berlin Airlift overcame a Soviet blockade of barge, rail, and road traffic into Germany's divided capital. The effort began with the resolve of U.S. President Harry S. Truman to halt the advance of Communism into a war-devastated city. On June 24, 1948, lacking coal, food, and electricity, 2 million Berliners looked to the skies for aid from the same military forces that had supplied Chiang Kai-shek. American radio lifted spirits by guaranteeing rations. Until help arrived, families snared songbirds for fresh meat. Truckers from the west delivered loads of oranges along the autobahn and tossed them to children on the roadside. Black marketers smuggled in edibles to Potsdammerplatz.

Although the Allies had scaled back their occupation forces, in the face of 1.5 million Russian troops primed for attack, General Curtis LeMay, assisted by Major General William Henry Tunner, organized a rescue dubbed Operation Vittles. On June 28, the first sortie of 32 Douglas C-47 Skytrains delivered 80 tons (73 metric tons) of flour, medicine, and milk, along with CARE (Cooperative for Assistance and Relief Everywhere) packages. Children named the four-prop transport planes "raisin bombers." The choice of dehydrated foodstuffs eased the burden for deliveries made by Douglas C-54 Skymasters, additional transports that rendezvoused at Rhein-Maine Air Base every four minutes for a half hour's unloading. On return flights, the planes carried a total of 1,113 malnourished children to aid stations.

With the aid of Australian, British, Canadian, and French crews and planes, American fliers pledged to supply 1,700 calories per person each day. In a gesture of forgiveness to Germans for causing world war, the Allies ferried tons of wheat, dried potatoes and sugar, dehydrated vegetables, cereal, oil, milk, and coffee. To fend off cold, the C-47 Skytrains flew 3,475 tons (3,152 metric tons) of coal and gasoline to the makeshift depot at Tempelhof Airport, where Mayor Ernst Reuter and aide Willy Brandt superintended distribution. Each plane bore 3.5 tons (3.2 metric tons) of needed goods, including cheese, cod liver oil, deboned meat, oatmeal, powdered eggs, sausage, vitamin C tablets, and yeast. Compassionate specialty hauls brought kosher food to Jews, saccharine to diabetics, and vegetable seeds to gardeners. The total shipments per day of 750 tons (680 metric tons) required rapid reinforcements of bigger, newer planes.

As the rotation advanced to 1,500 flights per day and 5,000 tons (4,500 metric

tons) of goods, canteen trucks dished up coffee, doughnuts, hamburgers, hot chocolate, and sandwiches to crews. The uplift to children brought relief from anemia, dwarfism, rickets, and tuberculosis. Pilot Gail Halvorsen, the “Chocolate Uncle,” treated German children to handkerchief parachute drops of chocolates and gum, dubbed Operation Little Vittles. With donations from confectioners, additional gifts of 3 tons (2.7 metric tons) of candy to children boosted morale and quashed tyrant Josef Stalin’s plan to sweep Berlin into his empire.

On August 1, Soviet propagandists tried to lure Berliners to the eastern sector with offers of free rations. In another ploy to overrun the capital, Russian harassment began with anti-aircraft guns and escalated to bomb and rocket attacks on Allied planes. A half million Berliners massed at the Brandenburg Gate to express thanks to their deliverers and to plead for further assistance against the Soviet siege.

Winter increased the demand for coal and the exhaustion of pilots and ground crews. In a logistical miracle, ex-Luftwaffe repair crews kept the heavy schedule on time; civilian volunteers repaired overtaxed runways with asphalt. Female laborers completed a new airport in the French sector. The upgraded airdrop enabled the Allies to sustain a daily caloric intake of 1,880 per person. By outflanking the Soviets, the Allies maintained the airlift until September 30, 1949, at a total cost of \$224 million.

Later Efforts

The Berlin Airlift set a precedent for subsequent humanitarian relief efforts. Altruistic aid produced mixed success in Biafra, Nigeria, in 1969. Although Nigerian officials banned Red Cross deliveries, an efficient mix of corn, soybeans, and powdered milk along with canned milk and dried fish arrived from Caritas and the World Council of Churches, which maintained ware houses on the Portuguese island of São Tomé. Despite food drops, 1 million people died from combat or starvation. In 1975, loads of rice relieved embattled defenders of Phnom Penh, Cambodia, the blockaded capital of the Khmer Republic, a holdout against Communism in Southeast Asia. Daily mercy flights in November 1990 to Asmara, Eritrea, attempted to relieve those suffering from the drought cycle in

the Horn of Africa. A parallel effort in Somalia in winter 1992–1993 involved U.S. military planes in extending a food lifeline to East Africa.

From July 3, 1992, to January 9, 1996, a multinational effort supplied 180,000 tons (163,000 metric tons) of goods from Ancona, Italy, and Frankfurt, Germany, to tens of thousands of war-beleaguered residents in Sarajevo, Bosnia. In 1993, the addition of airdrops in besieged Muslim enclaves dispatched 20,000 tons (18,000 metric tons) of food to the hungry. United Nations (UN) supervisors, led by Major General Lewis W. MacKenzie of Canada, offered hope to Sarajevans. Victims cowered beneath artillery, mortar, and sniper fire and surface-to-air missiles, too terrified to venture into local markets. At the end of the feeding project, UN officials proclaimed the effort the longest humanitarian air bridge in history. The success prefaced renewed flights of food, water, and cholera treatments to central Africa in July 1994, when U.S. forces aided refugees from genocide in Goma, Zaire.

Further taxing international aid networks, on July 29, 2005, the UN began a 23,000-ton (21,000-metric-ton) food airlift to Maradi, Niger. Flown from Italy to Niamey, goods required a truck convoy to convey supplies to some 80,000 starving people who were victims of drought and locust invasion of pastures. Survivors scoured the bush for edible grass and leaves. Even with the intervention of Médecins Sans Frontières (Doctors Without Borders) and gifts of thousands of tons of food and \$512 million in financial aid from the World Bank, cholera and malaria limited the chances for survival. The crisis threatened to spill over into Burkina Faso, Ethiopia, Kenya, Mali, Mauritania, and Uganda.

The next half decade saw Lockheed Martin C-130 Hercules transport planes and Boeing CH-47 Chinook helicopters bound for airdrops to war-torn Katanga, Congo, in 2007; for flood relief in Bihar, India, in 2008; for war relief in Sri Lanka in 2009; and for earthquake relief in Haiti and posthurricane aid in Guatemala in 2010. On July 11, 2011, news of a lethal food and water crisis in Nairobi and Turkana, Kenya, described the plight of 380,000 refugees of drought on the Horn of Africa. Some 12 million victims in Ethiopia and Somalia faced parched fields and no food. At camps in Dadaab, Kenya, child deaths multiplied sixfold from a malnutrition rate of 30 percent. On July 18, UNICEF (the United Nations' Children's Fund) began shipping nutrition and water to Baidoa, Somalia; on July 21, Kuwait Red Crescent Society dispatched two planeloads of medicine, tents,

and 20 tons (18 metric tons) of food.

Within the week, the UN urged donors to send immediate relief. Aid workers scrambled to serve nourishing Unimix porridge to preschoolers and beans, corn, and millet to adults arriving over “roads of death.” On July 25, a world airlift began importing emergency rations to Mogadishu, Somalia, and to border airports in Dolo, Ethiopia, and Wajir, Kenya. An Islamic backlash against Western charities—CARE and the World Food Program—blocked efforts to transport aid to endangered Africans.

See also: Famine Relief; International Food Aid.

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Alcoholic Beverages

From the Stone Age to the present, alcoholic drinks have increased conviviality at social gatherings and promoted euphoria and spirituality at festivals and rituals. By definition, ethanol is more drug than nourishment. By suppressing psychological controls on behavior, foods containing ethanol have freed interaction to include ecstatic dance and singing and enjoyment of card playing, dining, and sports. Yet, nations enjoying the release of intoxication have acknowledged the liabilities of “ardent spirits.”

The sources of intoxication range from fermented agave hearts in

Mesoamerican tequila and gentian root in the Angostura Bitters made in Tobago and Trinidad to sugarcane in Indian and Malay rum and fruit must and peppermint in European akquavit or schnapps. Ingredients have seemed as innocuous as molasses in Caribbean rum, lemon peel in Italian limoncello, pear pulp in English perry, antimalarial quinine in Dubonnet, and rice, hawthorn, and honey for drinks in Jiahu in Henan, China, in 7000 B.C.E. More complex drinks incorporated spice in Old English metheglin and vinegar in oxymel, beets and bitter oranges in Cointreau, coconut in Japanese and Sri Lankan arrack and Filipino vodka, and agave in mescal, a specialty in Oaxaca, Mexico.

Early Innovations

Alcohol originally served consumers as curatives. In 2100 B.C.E., Egyptian, Hindu, and Sumerian physicians advised patients on dosages. The Sanskrit Rig Veda (ca. 1200 B.C.E.) and epic *Ramayana* (ca. 400 B.C.E.) affirmed the fermenting of honey into Indian mead and refining ephedra into soma, a Zoroastrian hallucinogen. After 300 B.C.E., Turkish physicians at Cnidus listed hydromel, mulsum, and oxymel as cures of acute ailments.

Since 200 C.E., the Aztec served *aguamiel* (sweet water), which they fermented from thick, frothy agave sap. Collectors siphoned juice and scrapings from the leaves through a gourd tube. Fermentation for 10–15 days resulted in *pulque*, a ritualistic forerunner of tequila reserved for the clergy and royalty. During the colonial era, Spanish authorities licensed *pulquerias* and forbade consumption by mixed assemblies of men and women. Jesuit priests usurped distilleries and used the proceeds to build Catholic academies.

In the 800s, Slavic distillers turned grain into vodka, a bracing hard liquor that encouraged trade between Poland and Russia for service in Polish pubs. Healers recommended vodka as an aphrodisiac and cure for infertility. In 1386, Genoan legates introduced a grape drink in Russia. Trade relations between Krakow and Poznan bottlers and Silesian importers spread to Austria, Bulgaria, Germany, Hungary, Romania, and the Ukraine. The introduction of potato vodka in the 1810s increased demand, which by 2003 had risen to 5.3 million gallons (2 billion liters), one-quarter of the world's distilled spirits.

Gin emerged at Monte Cassino near Salerno in 1100, when Benedictine monks, instructed by translations of Arabic and Greek medical texts by Avicenna and Galen, distilled the juice of juniper berries. Across Europe during the Black Death in the 1300s, the fearful turned to gin as a remedy. Sold in pharmacies, the drink reputedly lessened the pain of arthritis, gallstones, gastric ills, gout, and kidney stones. Bootleg hooch inflicted debauchery and dependence on the Dutch and English, who besotted themselves with *jenever* and gin in the 1660s. By 1727, when consumption grew over the previous 37 years from 500,000 gallons (1.9 million liters) annually to 3.5 million gallons (13.2 million liters), crime waves ensued. Colonial authorities invented the gin and tonic, an effervescent mixer laced with quinine to prevent malaria.

In the 1200s, Europeans avoided cholera epidemics by drinking fermented grape pulp, small beer, and spirits. Monasteries produced floral and herbal bitters, digestives, and tonics, the bases of aperitifs and liqueurs such as Bénédictine from Normandy and Chartreuse, a Carthusian concoction from Vauvert, France, containing 130 herbs. Aromatics and flavorings included artemisia (wormwood) leaves in absinthe, a heady curative and intoxicant called “the green fairy” for its psychogenic effects. Opponents of absinthe claimed it turned men into bruisers and caused consumption and fits. Louche, the milky emulsion in Greek ouzo, a liqueur distilled from anise, extended into an adjective used to describe debauched, risqué behavior.

Simultaneous with the gin, pulque, and vodka industries, in the 1620s, Barbadian slaves at Holetown turned molasses into rum, a source of summery drinks. Healers used rum as a treatment for smallpox and a cleanser for corpses. Along with sugar, bottled rum boosted profits, with 102,000 gallons (386,000 liters) exported to Great Britain in 1884. In literature, rum fueled scenes of male debauchery and bar ditties in Robert Louis Stevenson’s pirate classic *Treasure Island* (1883).

On a more genteel scale, cream liqueurs, including Chambord raspberry liqueur, crème de cacao, and crème de menthe, concentrated the sugar content to produce syrups for flavoring ice or cakes. Additional cream liqueurs took their fundamental aroma and taste from almonds, apricots, bananas, cherries, citrus fruits, coconuts, currants, goji berries, lotus, lychees, melons, prickly pears, sloes, and strawberries as well as the blossoms of elder, roses, and violets. Jamaican Tia

Maria and Mexican Kahlúa, two coffee-infused liqueurs, added savor to cheesecakes, eggnog, and mixed drinks.

Society and the Imbiber

Much as they had in classical Athens, Rome, and Pompeii, village taverns anchored social life in colonial North America. Binge drinking burgeoned in the urban United States in 1829, among reservation Indians in the 1860s–1880s, and in the Russian military in the 1940s. Spirits dehydrated the body and depleted stores of vitamin B1, causing beri-beri, the source of cardiac arrhythmia and numb lips and tongue. Globally, drunkenness posed new dangers for drivers and pedestrians and influenced the outcomes of elections until cities closed saloons during voting hours. Teen overconsumption resulted in alcohol poisoning from episodes of “chugging” (gulping) spirits.

Long-term effects of overconsumption include alimentary and throat cancers, diabetes, gastritis, heart disease, impotence, mental illness, and pancreatitis. Because some 90 percent of alcohol metabolism occurs in the liver, heavy drinkers incur alcohol hepatitis, cirrhotic liver, and hepatic jaundice. The unborn children of alcoholic mothers may suffer fetal alcohol syndrome, an irreversible destruction of brain neurons and cause of behavior impairment. Because of liabilities of drinking hard liquor, tipping dropped after 1980 except in Japan, where consumption increased. As of early 2012, “white drinks”— gin, rum, tequila, and vodka—outdistanced brown whiskies in sales.

See also: Beer; Cider; Honey; Potatoes; Prohibition; Rice; Soft Drinks and Juices; Temperance; Vegetarianism; Whiskey; Wine; Yeast.

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Allergies, Food

An adverse physiological reaction to food, a food allergy results from an autoimmune response to a harmless protein that antibodies identify as toxic. From prehistory, a simple feeding of infants with breast milk bolstered immunity and reduced health risk from allergies. Around 400 B.C.E., Hippocrates, the Greek “Father of Medicine,” recognized mealtime reactions as a human incompatibility with common foods.

In 1905, Francis Hare, an Australian psychiatrist at Brisbane Hospital, developed theories of headache treatment in his two-volume treatise *The Food Factor in Disease*, which blamed the inability to metabolize starches and sugars for acute and chronic ailments. By extension, he cited food as the source of asthma, dyspepsia, eczema, gout, and nerve disorders. A year later, pioneer immunologist Clemens Freiherr von Pirquet of Vienna, Austria, named these hypersensitivities “allergies.”

Allergies to such common food components as gliadin in wheat, ovalbumin in egg white, parvalbumin in cod, and ripening agents in strawberries currently strike an estimated 6–8 percent of children under age three and 2 percent of adults. Abnormal reactions can be as mild as burning on the tongue, flatulence, itching eyes, tingling, and urticaria (skin eruptions or hives). More serious hyperactivity in the body may produce bloating and swelling, diarrhea, fainting, migraines, panic attacks, and wheezing. Sudden death is rare.

Dermatologists and immunologists attempt to isolate the cause of unidentified anaphylaxis. Clinicians test individuals by skin pricks and blood tests that recreate the physiological response. More exacting tests for life-threatening allergies that trigger heart arrhythmia and shock may involve feeding the patient a capsule of the suspected ingredient. A doctor monitors evidence of anaphylaxis,

particularly celiac disease, irritable bowel syndrome, throat constriction, and vomiting.

Treatment for food intolerance may require desensitization or eliminating harmful ingredients from the diet. The most common culprits include chocolate, eggs, milk, peanuts, shellfish, tree nuts (almonds, cashews, hazelnuts, pecans, pine nuts, pistachios, walnuts), and yeast. The allergens in cow's milk, casein and whey protein, may vary from the makeup of goat's and sheep's milk, two possible substitutes. Infant food formulators have attempted a similar protection of babies by making hypoallergenic infant formula from predigested hydrolyzed protein. For adults, treatment with antihistamines, epinephrine, and steroid creams and nasal sprays seeks to restore breathing and heart rate to normal levels and reduce inflammation in eyes, mucus membranes, and skin.

In 1975, Seattle gastroenterologist Walter Lyle Voegtlin, author of *The Stone Age Diet*, promoted the foods eaten by caveman as ideal sustenance for human wellness and stamina. He researched the Stone Age diet as a source of relief from alcoholism, allergies, and autoimmune disease. Because the Neolithic intake consisted of unprocessed foods, consumers lowered the risk of triggering responses to additives, including artificial flavorings, benzoate and sulfite preservatives in salad bars and white wines, and food dyes—Brilliant Black BN, Brown HT, Fast Yellow AB, Lithol Rubine BK, Orange B, Para Red, Sunset Yellow, Tetrazine, and Yellow 2G. In 2002, Loren Cordain, an expert in health and physiology at Colorado State University, promoted an evolutionary diet to rid humans of chronic afflictions from allergies.

Additives to processed foods generated concerns for allergies, resulting in serious reactions from monosodium glutamate, nut residue, poppy and sesame seeds, and red and yellow dyes. Because nuts can subvert the immune system, concern for lethal nut allergies demanded the monitoring of ingredients in public venues. School cafeterias shielded susceptible children from ingesting nut products. Food processors introduced voluntary labeling to alert consumers to nuts in multi-ingredient products as well as to foods produced in facilities that process nuts. In September 2006, Ronald van Ree, a researcher at Amsterdam University, predicted that genetic engineering would produce an immunotherapy vaccine for allergy sufferers within the decade.

See also: Additives, Food; Honey; Monosodium Glutamate; Nuts and Seeds; Shellfish.

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Amerindian Diet

For millennia, Amerindians survived uncertain times through the wise processing, distribution, and storage of local foods. The holistic philosophy of first peoples revered reciprocity in nature and the human place in the food chain.

During high productivity, food preparers prevented famine by dehydrating and smoking fish and venison, packing jerky with mint to discourage vermin, brining salmon and fermenting herring and salmon roe, leaching acorns for grinding into flour, and drying fruit leather on wood slabs or birch bark trays. Sedentary tribes froze salmon and cached camassia, Jerusalem artichoke, and yucca tubers in grass-lined pits. North Atlantic tribes tapped birch and maple trees for sap, which they crystallized into sugar cakes. The Haida, Nootka, and Tlingit of Vancouver Island submerged the eulachon (or candlefish) in oil to protect from insect infestation, mold, and rot and also to add fish oil to the diet.



Beans, maize (corn), and squash—the "three sisters" of Amerindian agriculture—grew interdependently. The bean vines climbed up the corn stalks and provided essential soil nitrogen. The squash plants spread along the ground to shade and protect the root system. (*North Wind Picture Archives/Associated Press*)

Pre-Columbian Native American Diets

People	Place	Staple Foods
Algonquin	Quebec	bear, bird, corn, eggs, deer, rabbit, and wild rice
Anasazi	American Southwest	amaranth greens, pinon nut, prickly pear fruit, and prairie dog
Aztec	Mexico	bee, cochineal insects, dog, duck, monkey, opossum, rodent, and turkey
Carib	Lesser Antilles	cassava, fish, lime, lobster, and pepper
Inca	Colombia and Peru	lima bean, pepper, potato, and tomato
Inuit	Alaska	beluga whale, ringed seal, seaweed, and walrus
Pawnee	Great Plains	buffalo, camassia root, chokecherry, elk, and turnip
Tafno Arawak	Greater Antilles	fish, iguana, parrot, and pepper
Tlingit	Northwestern Pacific	berries, chicory, salmon, trout, and wild celery

Tuolumne	California	clam, duck, geese, mussel, pine nut, salmon, sea otter, seal, smelt, trout, and whale
Tupi and Guarani	Amazon River	cacao, cassava, termite, and wild boar
Warao	Guyana	cassava, caiman, dasheen, eddo, and waterfowl
Yaghan	Tierra del Fuego	cranberry, guanaco, limpet, mussel, and wild celery

Some preservation methods required special tools and containers, particularly crocks and jars for burying soapberries and smoked salmon in sand, cedar boxes holding bound berry cakes, and underwater skin bags to fill with cloudberry, cranberries, crab apples, and lingonberries. The Cherokee, Hopi, and Navajo excelled at cultivating corn and beans and storing them in baskets.

The pre-Columbian diet of Native Americans focused on indigenous fauna. Specialties indicate the adaptation of human tastes to the locale and the number and variety of staples. For instance, the Aztec ate from a full range of animal life—armadillos, frogs, iguanas, rattlesnakes, salamanders, and tadpoles. Historian Bernardino de Sahagún issued the *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1540–1569), also known as the *Florentine Codex*, a multivolume overview of Aztec life that describes their use of a variety of chilies, peppers, and corn served in tamales and tortillas. In the Andes, cooks favored the meat of llama and guinea pig. Among Arctic Greenlanders and the Inuit of Nunavut in northern Canada, narwhal and *maktaaq* (whale skin) dominated the menu with a fat-rich cuisine that provided energy for life in subzero temperatures.

Food and Wellness

European observers admired the well-being of the Western Hemisphere's hunter-gatherers, such as the Yupik of Alaska, who proportioned seal blubber and blood to maintain the balance between body and spirit, and the Inca, who kept their soldiers healthy on dried bonito and shark, animal fat, and quinoa, a common cereal grain. In the tropics in 1527, Spanish explorer Álvaro Núñez Cabeza de Vaca admired the handsome Florida natives, whose diet produced a

strong but spare build as well as strength and speed for running. Explorer Jacques Cartier learned from the Algonquin of Montreal how to cure scurvy. During the winter of 1534–1535, native healers provided an evergreen drink made from the white cedar, which relieved French sailors of painful joints and loose teeth resulting from a deficiency of vitamin C.

George Catlin, the nineteenth-century American painter of the Crow of the Great Plains, described six-footers endowed with well-formed frames and graceful musculature. In 1864, French explorer René Laudonnière summarized the ability of Timucua women of eastern Florida to climb trees and swim rivers while carrying their children. Even elderly females loved dancing at feasts. With the initiation of anthropological surveys, gastro-ethnographers revisited foodways in Machu Picchu and Chichén Itzá and restructured the kitchen gardening and cookery of the Anasazi, a people of the American Southwest who, from 1200 B.C.E. to 1300 C.E., evolved the dietary culture of the “three sisters”: beans, corn, and squash, three crops that thrived when planted together.

Food studies of desert lands characterize a lifestyle devoted to survival. After service in Baja California from 1751 to 1768, Johann Jakob Baegert, a Jesuit missionary and author of *Observations in Lower California* (1771), compiled eyewitness accounts of the diet of Guaycura hunter-gatherers. He complimented them on their wellness and hardihood, despite a spartan intake of agave, fish, grubs and insects, mesquite beans, reed roots, turtles, and yucca washed down with water. They made forays every three days to areas offering more prolific scavenging and bow hunting. When hunger overwhelmed them, they sliced rawhide shoes and hides and devoured them. To relish meat flavor, they tied a piece with string, chewed and swallowed, then pulled the meat back into the mouth a dozen times for more savoring. They retrieved any seed of the pitahaya fruit that passed in the feces in a process the Spanish ridiculed as a “second harvest.” Because of their primitive culture, the Guaycura charred whole bats, birds, snakes, and voles in the flame rather than boiling or roasting them, which took too long. They quick-fried inedible pods in turtle shells; the fibrous agave required roasting in coals for half a day. Guaycura lives revolved so tightly around sustenance that their language contained little more than terms for scavenging, cooking, and eating.

Pragmatism and Syncretism

The recipes of first peoples demonstrated pragmatism toward what was available. The Blackfoot exhibited reverence for the whole animal by boiling wild onions with hooves, tongues, and udders and by consuming buffalo intestines along with the contents of semi-digested grass. They valued creamy marrow straight from cracked femurs and turned mammal intestines into casings for blood or meat sausages for roasting over coals. The Ojibwa added sassafras to boiling water for tea, poured broth over snow for a cold dish, and thickened soup with corn silk and pumpkin blossoms. The Cherokee made *sofkee* from soaked cornmeal and wrapped *nixtamal* dough in corn shucks to ferment before baking. The Narragansett one-dish meal called succotash, a bean and corn mixture, blended well with sunflower seeds, chopped pepper, pine nuts, or chunks of dog, fish, or venison. The Lakota devised *wojape* (fruit pudding) from pureed blueberries thickened with any kind of flour and water. To enhance wild rice, the Menominee boiled the grains in the broth of birds or fish and added such ingredients as cattail buds, cranberries, unfurled fern tips, honey, and wild sage.

Before contact with Europeans, the Amerindian lowfat diet produced sturdy organs and skeletons, little arthritis or dental decay, and no tuberculosis. The addition of colonial cookery to Amerindian food staples and recipes created a syncretic cuisine. For example, hominy, pumpkin seed tacos, and piki bread increased creative applications of corn; Indian pudding, a creamy corn dish, took on an Old World flavor with the addition of molasses.

At the same time, the introduction of beef, pork, pomegranates, and radishes teased the palate of first peoples. Spanish colonists added to the largely vegetarian Aztec regimen more dairy products and meat. From Basque and Portuguese settlers of the Maritime provinces, the Beothuk and Micmac learned to pack cod, venison, and oysters in barrels with generous sprinklings of rock salt. The increased sodium in the diet introduced Indians to cardiac ailments and high blood pressure.

With the displacement of tribes from traditional habitats, European colonists encouraged commercialization of plant and animal harvests and the elevation of profits above the sustenance and longevity of indigenous peoples.

See also: Aztec Diet and Cuisine; Barbecue; Cacti; Chicle and Chewing Gum; Columbus, Christopher; Curative Foods; Díaz, Bernal; Hudson's Bay Company; Hunter-Gatherers; Inca Diet and Cuisine; Jerky; Jiménez de Quesada, Gonzalo; Lapérouse, Jean François Galaup; Las Casas, Bartolomé de; London Virginia Company; Manioc; Mexican Diet and Cuisine; Pemmican; Peyote; Pit Cookery; Religion and Food; Royal Greenland Trade Department; Sauces and Saucing; Seaweed; Shellfish; Soft Drinks and Juices; Tortillas; Trade Routes; Travel Food; Vanilla; Verrazzano, Giovanni da.

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[Animal Husbandry](#)

A parallel to plant agriculture in civilized states, animal husbandry sustained a clan or community from the output of herds and poultry flocks. After 25,000 B.C.E., a time when over half the human diet derived from wild bison, caribou, horses, and mammoths, evidence suggests that feral mammals adapted to human presence as a source of protection from wild predators. Because of the contiguity of beast and humankind, hunting parties no longer had to track wild animals far from home.

In Africa, the Americas, Eurasia, and Australia, honeybees generated a sweetener and wax, a malleable repair material for pottery, and a commodity for sale or trade. Tame mammals provided dependable dairy goods and reliable sources of eggs and meat, tallow for lighting, and hides for rugs and shoes.

Cooking advanced from innovations in technique and tools for grinding, pit baking, pounding, roasting, and scraping. Because of predictable flock and herd growth, the human population density rose from one to 15 persons per square mile (9 persons per square kilometer).

Prehistoric Food Sources

Before the agrarian revolution, in the Tigris River basin from 13,000 B.C.E., humans managed wild boars, an available source of meat, fat, and useful bone, bristle, hide, and intestines for food storage. During the Neolithic revolution around 12,000 B.C.E., hunter-gatherers tamed those animals with a temperament amenable to flocking and herding and an ability to adapt to pens and barns, breed in captivity, and follow a human leader. To feed the most people during the transitional Mesolithic Age, early stockmen observed nature and selected animal traits, particularly for beekeeping, the earliest form of animal colonization. By revering nature as a beneficent source of nourishment, magico-religious ritual venerated food sources, such as bird eggs, fish, and yams.

After the formation of Abu Hureyra, Syria, in 11,050 B.C.E., a 1,000-year drought forced Natufians (early Palestinians) to settle near streams to pasture sheep, which converted grass to the first staple protein to feed human omnivores. In lieu of currency, sheep served as a medium of exchange in barter. From experimentation with ewe's milk, herders evolved highly nutritious feta and ricotta cheeses, blocks of pecorino and Roquefort hard cheeses, and *labneh* (strained yogurt), a basis of savory and sweet entrées eaten with bread, cucumbers, olives, olive oil, and onions.

Omnivores balanced their diet with foods from multiple sources. From 10,000 B.C.E., the Nordic Sami followed reindeer herds, which appeared on petroglyphs and on bone etchings as producers of milk and venison cooked over pit fires. The acceptance of grain as a daily staple paralleled the domestication of dogs, goats and ibexes, pigs, and sheep for fiber, meat, and milk. In the Zagros region of Anatolia, herders first domesticated the goat from the Bezoar strain, herbivores that lived on bark, berries, grass, and leaves. Herding clans profited from goat's milk and meat as well as dung for cooking and heating fuel, hair for fabric, hide

for carafes, and sinew for sewing. Goat herding spread to Iran and Israel, where graziers developed milking and meat cutting, fiber weaving, and leatherwork as specialized crafts.

In Germany, Iraq, and southeastern Turkey in 9000 B.C.E. and Iran in 8000 B.C.E, innovations of Neolithic, or New Stone Age, cuisine advanced the taming of goats as dairy animals and the penning of pigs as a four-legged pantry. Studies of year-old animals in bone heaps attested to the sophisticated taste of meat eaters.

In this same period, North American Athabascans tamed the camp dog from the feral wolf as their only domesticated beast. The dog earned its keep as hunter, guardian, dray animal, and rodent and snake controller. The eating of dog meat paralleled similar consumption of small canids in China, Korea, and Vietnam.

Wild and cultivated beef consumption also dates to prehistory. Cave paintings at Lascaux, France, pictured the hunting of the aurochs, the ancestor of modern cattle, which flourished from sub-Saharan Africa throughout India and the Middle East. Herders in India raised another scion, the zebu, for wagon pulling and meat and evolved dairy foods from cows. In the Chihuahua Desert on the Tex-Mex border, around 7500 B.C.E., Paleo-Indian settlers grew grains and consumed quantities of milk, cheese, and meat from domesticated animals.

Husbandry as Survival Skill

Around 7000 B.C.E., during an era that saw depletion of the wild gazelle from overhunting, food growers evolved formalized methods and strategies. In Papua, practical farmers raised root crops and sugarcane alongside pigs, eager recyclers of otherwise wasted greens and stalks. In 6000 B.C.E., Indian, Iranian, Pakistani, and Thai farmers tamed elephants for lifting and pulling chores and domesticated chickens, offspring of the red jungle fowl, a tropical pheasant. In the Far East, Chinese and Indonesian crop tenders integrated the vegetable and grain diet with chicken and fish netted from rivers. The broad-based diet fueled a population explosion.

After 5200 B.C.E., animal rearing began to generate a sedentary lifestyle that prefaced the rise of city-states. Sumerians, the empire builders at the Tigris and Euphrates delta, bred cattle and sheep after 5000 B.C.E. At Ur, state-run agriculture

systematized staffing, which migrated according to seasonal demands to cut grain for fodder and reeds for barn bedding. Farm foremen supervised the harnessing of onagers and oxen to plows, the caching of forage for winter feed, and professional butchery. Secondary products from cattle added 5 quarts (4.7 liters) of butter and 7.5 quarts (7.1 liters) of cheese per cow to income. In the Indus Valley, farmers enhanced their diet with butter and cheese from their herds, two sources of interregional trade. In the Ukraine about 4500 B.C.E., herders tamed the horse, a major contribution to streamlined labor and transport for warriors. Scythians milked mares to produce koumiss, a staple drink as far north as Mongolia. Europeans ate horsemeat and revered the dish as the focus of a religious propitiation of the Germanic god Odin.

Around 4000 B.C.E., the swan entered waterfowl culture in Britain, Ireland, Italy, and Portugal. Simultaneously, the Chinese tamed the duck and water buffalo, a source of mozzarella cheese and curd, while Eurasians moved plows and sledges with the aid of a pony later named Przewalski's horse. Arab nomads herded dromedaries for milk to make butter and yogurt. Persians later roasted whole camels for feasts and reserved hump meat for special occasions; Armenians wind-dried the meat for *pastirma*, a spiced travel food. In this same period, the Andean Inca raised alpacas, guinea pigs, and llamas for meat. Farther north, residents of Yucatán tamed the wild turkey, a bird found only in the Western Hemisphere.

In another burst of agrarian innovation, the mid-fourth millennium B.C.E. saw rapid improvements in farming technology, followed by the domestication of geese and rock pigeons in China, poultry farming in India and Pakistan, and the taming of the wild ass on the Black and Caspian seas. As animal power for pulling the ard or frame plow, the buffalo, camel, and donkey overturned surface crust to access moist subsoil for seeding. In Great Britain and Scandinavia, plowmen amassed stones into barriers and markers of property lines. Pork production took prominence among stockers because pigs converted 35 percent of plant energy—acorns, beechnuts, and chestnuts—to meat, as contrasted with sheep at 13 percent and cattle at 6.5 percent. South of the Alps, religious taboos declared swine too dirty for human consumption.

Animal domestication made demands on the farmer for wintertime feed and barn straw, but provided beasts for meat during the thinning of herds. Among the

Nenet, the indigenous people of the Russian tundra, in 3000 B.C.E., semidomesticated reindeer herds produced both milk and meat as well as hides for clothing and shelters. In Crete, Egypt, Israel, and Knossos, skeps (domed hives of straw) held honeycomb. The squab, a domestic pigeon, yielded succulent meat; the goose became a specialty food and layer of protein-rich eggs. Hebrews fancied the tame dove. By 2500 B.C.E., Central Asians in the Tibetan Plateau, Mongolia, and Russia added both the double-humped Bactrian camel and the yak to agrarian investments as meat animals and sources of dung for fuel and strength for caravanning. From Burma east to Borneo and Java, stockmen kept peafowl in pens and bred banteng and gayal, ox-like dray animals.

The domestication and breeding of livestock improved the human diet with nutritious cheese, meat, and milk. Among the Inca of Altiplano, Peru, alpacas and llamas provided meat deemed special to the gods. About 2000 B.C.E., stockmen domesticated the guinea pig, a fast-multiplying meat source that thrived on vegetation. Andeans cooked guinea pigs by stuffing heated stones in the carcass. They valued the entrails for flavoring gravy or sauce and for adding to potato soup.

Classical and Medieval Husbandry

In the classical era and early Middle Ages, North Africans introduced the barbary, or ringneck, dove to pen fowl. Roman texts by Columella, Hyginus, Varro, and Virgil revealed the refinements of the classical era, in which apiculture (beekeeping) and the gathering of honey and wax produced goods for the table and for export. In 200 B.C.E., Cato compiled veterinary treatments for sheep that combined lupine extract, olive oil dregs, and wine. The colonizing of rabbits on islands stocked meat for ships' larders. In 162 B.C.E., the castration of the capon produced a plumper bird than the hen or peafowl for roasting. Roman Spain produced squabs (pigeons) for meat markets. Umbrian herders bred Chianina oxen, a valuable draft and beef animal.

The propagation of animals in the first century B.C.E. increased animal diversity. On the march of Roman legions into Gaul in 52 B.C.E., provisioners took along the pheasant, a source of eggs and meat. In attempts to strengthen

farmyard investments, Asian stockers practiced animal acupuncture as early as 10 C.E. Parallel to high market-quality ox breeding, the Japanese brought Wagyu cattle from the Korea Peninsula to cultivate rice fields and supply marbled beef prized for its juicy tenderness. In Peru, the Moche tamed the alpaca, llama, and vicuña, three producers of meat and soft wool. The use of llama dung as fertilizer increased the yield of Peru's green revolution.

In 534 C.E., agro-encyclopedist Jia Sixie, the prefecture of Gaoyang County in Shandong Province, compiled *Qimin Yaoshu (Skills for Peasants)*, one of the world's oldest farming treatises. Out of concern for the underclass, Jia observed tillage techniques in Hebei, Henan, and Shanxi and summarized animal herding and feeding and methods of selective breeding and vinegar and wine fermentation. He also published an overview of contemporary monographs on fish raising in rice paddies and making yogurt.

Over the next five centuries, husbandry techniques focused on small details of food production. Medieval hunters trained falcons, ferrets, and hawks to flush rabbits from warrens into nets. Regular stalking yielded little meat but prevented leporids from overrunning gardens and devouring vegetables. By maintaining dovecotes at manor houses, stockmen kept poultry at hand to supplement pantry staples and for sale at village markets. The Japanese domesticated quail in 1100 as a source of attractive entrées and tiny eggs for exotic plate adornments and street food.

Stocker evolved more food diversity based on climate and terroir. Around 1200, Christian monks in Yorkshire and the Rhineland turned eel weirs and pond tending into a form of pisciculture that yielded bream, carp, eels, and fish milt, a nonred meat source during Lent and other meatless holy days. During the same era, because of a short growing period, the settlement of Iceland rated the tending of stock above other areas of agriculture. After deforestation, goats thrived on the underbrush, while cattle and pigs fended for themselves, often freezing in the bitter clime.

European farmers raised the peafowl for meat and ornamental feathers and followed the advice of fourteenth-century French naturalist Gaston Phoebus on the treatment of animal bites and wounds with raw wool soaked in olive oil, a source of natural anesthesia and antiseptis.

In post-Columbian Mesoamerica, European explorers introduced horses and

hunting hounds. For the indigenous farmer, the new mammals pulled plows and travois, a wheelless drag useful for ferrying light loads. By the late 1500s, stockers built rabbit hutches and sold the meat for frying, roasting, and stewing.

North American Experiments

During the agrarian phase of North American development, graziers broke more virgin prairie than ever in the course of history and armed themselves against rustlers. More than half the population of Canada and the United States worked livestock by branding, neutering, and worming their animals. On ranches after 1749, the crossbreeding of the cow and buffalo resulted in resilient herds of beefalo. Importation of Merino sheep from Britain created new opportunities for New England graziers to raise a more adaptable ruminant. Three more imports, the early maturing Berkshire, the compact Spanish Duroc, and weighty Poland-China swine, intensified North American pig breeding and raised prices for more flavorful, moist pork suited to longer cooking at high temperatures.

Cattle breeding entered a scientific phrase in 1840 after Americans imported vigorous British Ayrshire and meaty Galloway and Hereford cattle for ranches and Dutch Holstein-Friesian and Jersey milkers for dairies. Stockers began consulting husbandry manuals and displaying prize scions at county fairs and stock exhibitions. After the emancipation of slaves in 1863 and the subsequent collapse of the Southern plantation system, an independent U.S. Bureau of Agriculture oversaw the expansion of frontier cattle and sheep ranches. The staff of 30 bureau scientists introduced hardy livestock and answered questions about mad cow and other zoonotic diseases. The last half of the century saw the manufacture of the Langstroth beekeeping frame to streamline honeycomb collection and the addition of the ostrich to exotic poultry farming and the sale of feathers to decorators.

North and South American ranching methods allowed calves to forage the grassland outside of villages and settlements, particularly in Argentina, the world's third-largest beef exporter. Hollywood later romanticized the task of the cowboy, gaucho, and vaquero, the mounted wranglers of the Western Hemisphere who ensured herd safety. Science and technology assisted postwar

agrarians with drought and other cyclical obstacles. The manufacture of chick incubators and farrowing pens lowered mortality rates in the young. Stampede and wildfire alarms and windmills reduced the chances of losing animals to common hazards. Navajo shepherding in the San Juan River valley, New Mexico, ensured independence for the nation's most prosperous Amerindians.

Abraham Lincoln harbored prospects for a secure food supply from frontier ranching. On July 2, 1862, congressional ratification of the Morrill Land Grant Act authorized federal distribution of 17.4 million acres (7 million hectares) of public land. During the Indian Wars, the military increased consumption of beef, raising the profitability for stocking and homesteading on the Great Plains.

On the northern Texas border at Guthrie in 1870, Samuel Burk Burnett of the Four Sixes Ranch interbred longhorns with British shorthorns, which gained popularity in Australia, Canada, Ireland, New Zealand, South Africa, Uruguay, and Zimbabwe. Captain Richard King of Corpus Christi bought up the 860,000-acre (348,000-hectare) King Ranch, the world's largest. Under protection of Texas Rangers, Burnett and King plotted cattle drives to Kansas railheads for transfer to Chicago stockyards. Carcasses of King's American-bred Santa Gertrudis steers traveled by rail to meet the demands for beef at Atlantic Coast inns and restaurants.

Profitable Ranching

After passage of the Desert Land Act on March 3, 1877, Oregon livestock required the cultivation and watering of 640-acre (260-hectare) plots of semiarid public land at a cost of \$1.25 per acre (\$3.09 per hectare). Agronomists in Nevada guarded turf and waterways as the life-or-death resources to support grasslands and livestock, which generated food as well as horn for tools, hooves for glue, and blood and bone for fertilizer. Fearing ruin from quarantines, breeders agitated for cures for hog cholera, pleuropneumonia, and tick fever. Barbed wire fencing of free prairies led to protracted range wars over independent pasturing rights. Overgrazing plus a disastrous blizzard in 1886 drove some ranchers out of business and forced others to diversify. In one experiment with scaled-back stock, North Americans raised the pigeon for squab meat, a specialty market item.

In the 1900s, science professionalized animal husbandry to predict and manipulate the value of tame animals. Tuberculin tests isolated sick cattle in 35 states. With the Great Plains of Canada and the United States thoroughly settled by 1920, agronomists turned to heightened yield by breeding more productive animal varieties, cattle vaccines, and species resistant to the hoof-and-mouth virus, spread by air and fodder. Colombia and Panama, meanwhile, developed resilient sheep herds.

In 1926, long-distance refrigerated trucking linked consumers with fresh beef, chicken, pork, veal, eggs, and milk. The importation of New Zealand targhee sheep, a source of tender lamb, and British landrace hogs, producers of flavorful bacon, further diversified meat sources. In the 1940s, the addition of French Charolais cattle to North American herds raised standards for tender beef. Pre—World War II collaboration with South American agronomists enhanced diversity throughout the hemisphere and heightened surveillance against zoonotic disease. War time food rationing in England and northwestern Europe returned the dove, pigeon, and horse to favor as supplements to the meatless table.

Enhancing the demand for contract staples, food stamps and the 1946 National School Lunch Act guaranteed markets for eggs, meat, and milk. Keeping pace with conventional farming, such innovations as the growing of mussels, oysters, and salmon by New Zealand aquaculturists broadened the definition of farming to include hydroponics and controlled catfish and tilapia pisciculture. Electric fencing protected investments by stopping strays and warding off coyotes, hyenas, wild dingo and dog packs, and wolves. From advances in artificial insemination for genetic diversity, cloning, and embryo transfer from quality breed stock to surrogate females, animal husbandry amplified herd quality and profitability. In the 1990s, People for the Ethical Treatment of Animals (PETA) and other animal rights groups stepped up protests of inhumane treatment of farm animals—small pens for calves and pullets, stunning devices to control bulls, and the absence of water and space during transport of animals to abattoirs and poultry processors.

Herding and Mechanization

By the twenty-first century, technology had advanced selective breeding and biotech crops and livestock, such as squab bred for breast meat in France, Italy, the Middle East, Nigeria, North Africa, and the United States. Chefs in China and global Chinatowns reserved the squab for New Year's banquets. Print and electronic advertisement prompted the health conscious to demand pigeon over chicken because of lowered microbe count. In defiance of factory farming, organic husbandry evaluated the placement of livestock on the land near flowing water to reduce pollution and animal stress while producing for sale healthful eggs, cheese, milk, and meat. Managers oversaw sanitary feedlots and housing and scheduled seasonal diet and vaccines to protect the food supply from such microbes and parasites as brucellosis, trichinosis, and tuberculosis.

Future intervention in faulty livestock management anticipated a cleaner, more sustainable universe. At Penn State University, dairy nutritionist Alexander Hristov proposed a diet to control bovine gut microbes and limit the emission of green house gas. The reputation of agribusiness deteriorated in the public's esteem following revelations of unjust farm subsidies and veterinary antibiotics and growth hormones in meat. Grassroots actions by locavores reclaimed the farmer's market and popularized heirloom varieties and Slow Food, a resurgence in artisanal sausage, goat cheese and milk, and eggs from free-range hens.

By 2050, according to a 2006 United Nations Food and Agriculture Organization report, the world will risk ecosystem collapse from "Livestock's Long Shadow." Analysts itemized green house and methane gases as causes of global warming and condemned deforestation and land and water damage generated by the overgrazing of livestock and the penning of poultry. A comparison of water use cited graziers for needing 21,877 cubic yards (16,726 cubic meters) of water to produce a ton of beef in contrast with potatoes, which required only 174 cubic yards (133 cubic meters). Vegans and vegetarians enlarged on lopsided use of natural resources as justification for condemning meat consumption.

See also: Agriculture; Buffalo; Hormones in Food; Manioc; Organic Foods; Slow Food.

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[Aphrodisiacs](#)

Since ancient times, consumers have classified as aphrodisiacs any food that enhances sexual pleasure and potency. To heighten fertility and performance, Phoenicians added saffron to moon cakes, which honored Ashtoreth (Astarte), the goddess of fertility and sexuality. In Mesopotamia, the hot, spicy taste of asafetida in food contributed an aromatic stimulus to romance. For Arabs, the chewing of nutmeg increased fecundity over a three-day period; in Yemen, the same effect came from eating walnuts.

Vitality from liquids and solids, such as those listed by the ancient Greek encyclopedist Theophrastus, became the source of carnal appetite and satisfaction. For strength, the Chinese preferred caterpillar fungus, ginseng tea, and bird's nest and shark fin soups. In the early 1400s, Huou (Hu Szu-hui), the chef of Kublai Khan's imperial kitchen, chose eggs and onions, the tried-and-true dish, for a self-indulgent master who had to satisfy a sizable harem. The secret to bursts of Greek energy, honey cakes bristled with poppy seeds, a source of potassium and sugar. The Greeks heightened desire by chewing thyme or mint, a stimulant that Alexander the Great denied his Macedonian army to deflect their interest from women toward war.

The Romans invented a variety of priapic aids, including chervil infusions to reduce prebedtime tension. A presex punch, hippomane, blended herbs with genital secretions from colts to lengthen male staying power. For unflagging

libido, the Roman poet Ovid recommended shallots. The Emperor Tiberius preferred skirret, a tuber similar to salsify; he imported the roots from Germania to serve with vegetables to boost his lust. The satirist Martial relied on onions, a cheaper, locally available tonic crop also recommended by the gourmet Apicius and the physician Galen for its restorative juice.

Throughout the late Middle Ages and Renaissance, mystic love potions inspired aphorism, song, and verse, with ingredients varying as widely as the turtle eggs admired in Borneo and wild thyme tea steeped by the Alaskan Inuit. The Moroccan scholar and traveler Ibn Battuta relied on coconuts for marital success with multiple wives; Marco Polo returned from China with advice to warm women's hearts with mandarin duck soup. For Catherine de' Médiçi, artichokes spurred passion.

English herbalist William Langham's *The Garden of Health* (1579) recommended aromatic rosemary as a goad to lust. The English also revered coriander, which they added to hippocras, a wine cordial heated with a hot poker. Henry VIII preferred bedtime sherry warmed with pungent caraway seed. His daughter, Elizabeth I, added fragrant vanilla to marzipan, a stiff candy shaped into human body parts for table decorations and nuptial gifts. Sarsaparilla-flavored drinks, the first European food fad from the New World, reputedly cured impotence. In the eighteenth century, Prussian King Frederick the Great aroused his passions with a mustard concoction from his secret recipe.

Through the centuries, erogenous dishes reputedly stimulated blood to the genitals and affected coital function and conception in a variety of ways:

boost fertility: basil, bull testicles, caviar, coriander, ginger, grain, honey, kola nuts, leeks, mandrake, mustard greens, papayas, parsley, pomegranate, sage, tansy, walnuts

enhance performance: cactus flowers, cardamom, chili pepper, coconut, ginseng, honey, maple syrup, nettles, pineapple, pine nuts, purslane, shrimp, tea, turkey, yohimbe bark

inspire fantasies: artichokes, asparagus, avocado, cinnamon, cucumbers, figs, fugu (pufferfish), ginkgo, nutmeg, raspberries, strawberries, tomatoes, whipped cream

lower inhibitions: absinthe, celery, champagne, cherries, damiana tea, lavender, marijuana, pepper, pumpkin, saffron, salted peanuts, wine

stimulate passion: anise, arugula, asafetida, betel nut, celery, chocolate, coffee, fennel, garlic, gentian, licorice, *quat* (Abyssinian tea), sage, tobacco, truffles, vanilla

Foods associated with love deities, such as the Greek love icon Aphrodite's scallops and sparrows, the Greek wine god Bacchus's grapes, and the West African sky power Min and the Egyptian chaos god Seth's preference for lettuce, bore an erotic mystique. As antidotes to the over-ardent lover, chefs served beans, dill, lentils, marjoram, rue, soy, watercress, and water lily root and offered tobacco and whiskey at the end of the meal to dampen desire. Small doses of a chancy food additive, nightshade, a hallucinogen and alkaloid poison, reputedly increased sexual energy.

Foods visually associated with ova, phalli, and semen, such as almonds, bananas, carrots and parsnips, cucumbers, eels, eggs, orchid bulbs, radishes, rhinoceros horn, and river snails, engendered erotic mythology. The Aztecs viewed the avocado as a scrotal-shaped stimulant to male sensuality. Widespread global lore lauded oysters because they resembled female labia and vulva; similarly, apricot and melon halves looked like breasts. The all-purpose mandrake suggested the human groin in full stride.

See also: Ibn Battuta; Medieval Diet and Cuisine; Pliny the Elder.

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[Apicius \(fl. 25–45 C.E. \)](#)

The wealthy Roman gourmet and cookbook author Marcus Gavius Apicius compiled recipes from the kitchens of ancient Rome, Greece, and Egypt. A native of the Campania region in southern Italy, he flourished during the reign of the Emperor Tiberius. He earned his cognomen from Caelius Apicius, a gourmand living in 90 B.C.E. Historians surmise that the nickname may have been a generic term meaning “professional chef.”

Because of Apicius’s composition of an illustrated recipe book, *De Re Coquinaria* (*On Cookery*, ca. 35 C.E.), Rome became one of the few ancient cities to have codified its cuisine. Perhaps drawing on the experience of professional cooks, Apicius organized entries into ten books, beginning with a description of the chef’s job and advancing to meat, garden produce, varied entrées, legumes, poultry, gourmet specialties, mammals, seafood, and fish. Missing from the compilation are chapters on pastries and desserts. For his gluttony, he earned sneers from Juvenal and Martial, imperial Rome’s chief satirists.

Apicius’s writing style detailed the meticulous care of a professional cook who handled sautéing, stirring, and seasoning personally, rather than supervising slave helpers. His language, the mundane Latin of the streets, lacked elegance but bristled with exact terms for forcemeat, mincing, mortaring, and trussing. His tone suggested a man intent on his work, such as whisking egg batter for pancakes, pureeing lettuce with onions, twisting heads and sinews off wild birds, skewering a sow’s udder, and cooling chicken salad with snow. He advocated boiling wild boar in seawater and shaping gingered dolphin or rabbit into meatballs and touted the blending of eight leafy greens with pulses and barley for a vegetable ragout.

Master Chef

Apicius was a hands-on cook who apparently evolved recipes by trial and error. He appeared to abjure garlic as peasant food and specified beans only from Baiae, which he served with celery, *caroenum* (wine concentrate), and *liquamen* (fermented fish sauce). His instructions avoided exact amounts. Instead of measuring spoons, he depended on the educated mouth, by which he tested sauces for balance and proper flavoring as well as for texture. His dishes earned

him the regard of encyclopedist Pliny the Elder, who proclaimed Apicius “the greatest and most prodigal gourmand of all.”

The writer’s knowledge of flavorings extended from the usual—almonds, basil, coriander, cumin, dill, fennel, leeks, mint, and pine nuts—to the lesser known, such as fleabane, grape hyacinth bulbs, laser root (a relative of fennel), lovage, nettles, and origanum (wild marjoram). Of his 470 recipes, 349 contained pepper. He specified dried, fresh, leafy, or seed rue to flavor olives, pickles, or wine. To ensure quality ingredients, he sailed to Libya to sample North African shrimp, then rejected them as too ordinary for purchase. For everyday fare, he outlined the creaming of hot mayonnaise and the preparation of *mulsum* (honeyed wine) for travel.

Apicius favored the elitist palate. Among his extravagances, he advocated marinating red mullet to make the most expensive *garum* (fish sauce). He recommended sauces featuring sweet and sour turnips and imported Armenian plums and Jericho dates and endorsed feeding swine on figs and a final meal of *mulsum* (sherry). His stuffing for chicken and fish included cabbage and mustard, fish sauce, and tender black bryony, which resembled asparagus shoots.

His gourmet recipes and dinner arrangements earned him cash gifts from the imperial family. Although biographical details are limited, he reputedly used his professional fortune to endow a culinary training center.

Legacy

To disguise the basic flavor of fish, meat, and vegetables, Apicius compiled 270 recipes for entrées and 200 recipes for sauces. His balance of simple staples and layerings of complex flavors resulted in such recipes as lentils cooked in coriander and rue, fish sauce, honey, leeks, raisins, and vinegar. He promoted use of the cucumber with bread steeped in vinegar and the dressing of cucumber salad with honey and fish sauce.

In an aside to the thrifty, he proposed preserving quince in grape must, a sweet aperitif made from three parts grape pulp reconstituted with ten parts honey, and keeping asafetida in a container of pine nuts to extend the use of the expensive herb. In an early form of aromatherapy, his beverages featured citrus leaves and

the petals of

Recipe: Sweet-and-Sour Fried Fish Fillets

Parboil four large fish fillets and save the stock. Boil six peeled parsnips or turnips and mash to a pulp. Stir-fry 1 tablespoon of flour in 1 tablespoon of olive oil. Add 1/2 cup of fish stock to the roux. Stir in 1/4 cup of white wine, 1 teaspoon of honey, 1/2 teaspoon of cumin, 1/8 teaspoon of saffron powder, and four crushed laurel berries. Bring to a slow boil, then simmer the sauce for 30 minutes. Roll the fish fillets in the vegetable pulp and fry in olive oil. Remove to a heated platter and top with the sweet-and-sour sauce and a sprinkle of red wine vinegar.

roses and violets. He favored the wealthy with cheesecakes, rice starch gruel, and exotica such as five-course meals featuring flamingo tongues, oversized prawns, and squid while demeaning such plebeian fare as cabbage.

The extant text of *On Cookery* contains anachronisms introduced later, such as description of the imperial bulimia of Apicius's disciple Vitellius, who ruled the empire briefly in 69 C.E. The emperor stuffed himself four times a day with heavy meals, then drank emetics and disgorged the excess. At one banquet, the emperor's brother Lucius served 7,000 birds and 2,000 fish. Vitellius reciprocated by dispatching battleships east to the Aegean and west to Hispania to collect ingredients for the Shield of Minerva, a complex salad of charfish liver, eel entrails, flamingo tongues, and peacock and pheasant brains. Another disciple, the epicure emperor Heliogabalus, admired Apician curiosities and acquired his own—camel heels, cockscombs, nightingale tongues, parrot heads, and partridge eggs.

These irregularities in *De Re Coquinaria* suggest that posthumous additions continued altering Apicius's original recipe collection into the fourth century C.E. Nonetheless, the fragmented text, written at Rome's height, remained a favorite at medieval monasteries and Renaissance palace kitchens.

See also: Cookbooks; Grilling; Medieval Diet and Cuisine; Pliny the Elder; Pulses;

Sausage; Shellfish.

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Appetizers and Hors d'Oeuvres

The service of appetizers, or starters, has a long history as a preface to the eating and digestion of a satisfying meal. In Egypt around 1450 B.C.E., tomb art depicted hand washing in aromatic unguents preceding hors d'oeuvres and grand banquets. The implied purpose, contrast of aroma, taste, texture, and appearance, encouraged chefs to import unusual foods for their color and mouthfeel.

The Greeks introduced the appetizer buffet. To encourage fellowship, they passed a loving cup, a two-handled drinking bowl, for sharing an aperitif of hippocras (spiced wine), mead, or vermouth (wine fortified with aromatic herbs). For Greek cuisine, Cypriot capers and marinated hyacinth bulbs provided savory tight buds for pickling with onions. Zingy vinegars and olive tapenade added pizzazz to rural dinners of beans and peas, lentil soup, and cups of goat's milk.

Among the Romans, the *gustatio* (salad course) consisted of platters of eggs, lettuce, mushrooms, and radishes. For more sumptuous feasts, slaves offered salvers of boiled fungus, clams, dormice, jellyfish, mussels, onions, oysters, and prawns. Hosts passed trays of such rich, bemusing tidbits as pickled fern shoots and sea urchins with *mulsum* (sherry), a sweet aperitif made from three parts sour grape must reconstituted with ten parts honey. The conversation stimulators became a prelude to six or seven courses, which filled a three-hour evening of *gustus* (tasty pleasure).

Middle Ages

For the table of Byzantine Emperor Justinian the Great in the early sixth century, the Empress Theodora aimed for dining ambience. She hired Greek, Indian, Persian, and Syrian specialists to plan an impressive variety of cold appetizers—creamed eggplant, hummus, and garlic paste on bread triangles—to complement grilled sea bass and sturgeon or roasted suckling pig. Dishes of caviar gave evidence of the host's willingness to pay for the best in seafood.

Around 900 C.E., Arab insurgents in Iberia introduced the Spanish to food sampling in the style of Jordanian and Lebanese *mezes* (appetizers) of baby spinach, melon cubes, olive paste, pickled turnips, and sardines. The charming presentation developed into tapas (Spanish for “lids”), small portions of free bar munchies set on top of glasses of beer and enjoyed in Seville and spread throughout Andalusia. The reduction of entrées to samplers of chorizo, cheese tarts, and mussels grew into a national flare for serving satisfying bites with drinks of Manzanilla sherry or sangria.

In the 1500s, the English adopted the “antepast” as a true appetite titillation, similar in panache to the French *amuse-bouche* (mouth teaser), an arty display of the chef's talent. The introduction of the term *hors d'oeuvre* (apart from the main work) in 1691 in Paris by François Mas-sialot, premier chef of Louis XIV, indicated the passing of entremets, light extras such as artichoke hearts, served on oval trays or footed compotes to complement a main course. Beribboned baskets of table favors, such as almonds and marzipan, marked place settings. Open-faced sandwiches contrasted make-your-own service in Chile, China, and Ethiopia, where guests chose a relish to roll up hot dog-or taco-style in *injera* (flatbread).

Modern Era

In *Il Cuoco Piemontese Perfezionato a Parigi* (*The Piedmont Cook Perfected in Paris*, 1766), an anonymous testimonial to Italo-French cookery, the term *antipasto* defined a first course rather than a preliminary warm-up. Savories arrived small enough to eat in one bite without the help of a knife and fork, such

as a small chunk of melon wrapped in prosciutto or a phyllo nest filled with blackberry jam. Each emphasizes a three-dimensional quality of food and the geometrics of, for example, square crackers or round vegetable patties topped with aioli, a garlicky mayonnaise.



Spanish tapas, bite-size appetizers served cold or hot at bars and social gatherings, evolved from early Arab fare. Local ingredients and cooking methods have made tapas a varied and sophisticated cuisine in their own right. (Gallo Images/Rex Features/Associated Press)

Nineteenth-century Europe developed the appetizer into a culinary masterpiece. In 1891, Pellegrino Artusi, the Bolognese author of *La Scienza in Cucina e l'Arte di Mangiar Bene* (*Kitchen Science and the Art of Eating Well*), characterized appetizers as “delicious trifles,” a taste sensation on *crostini* (bread crusts) preceding the service of pasta. In Sweden, the smorgasbord moved away from tempting trays to a full buffet piled several layers high with butter balls and cracker and bread baskets to accompany frittatas, gravlax, hard-cooked eggs piped with creamed fish, meatballs, pots of beans, apple cake and lingonberries, carafes of aquavit and *jenever* (gin), and urns of coffee. Swedish hostesses

showcased their relishes on china and crystal pedestals and silver chafing dishes. The star of the show, pickled herring, has a long history in European diet, down the coast from Finland to Portugal and inland to Polish Jews.

Worldwide, from Chinese pickled turnips, Korean *gujeolpan* (decorated pancakes), Japanese daikon radish slices, and Hausa groundnut balls in Nigeria to Cantonese dim sums (dumplings) and Hawaiian pupu platters, starters prepare the taste buds for vegetable entrées, fish stews, soups, or roast meats. In Russia, *zakuski* names the profusion of black bread, duck tartare, and marinated mushrooms and plums, a buffet array that precedes formal table service. Sicilians arrange the most visually appealing morsels—anchovies, cured ham and pecorino, figs, and preserved lemon— on an antipasto tray to lure guests from conversation toward a place at the table.

High-toned dining rooms distribute whimsical appetizers as a signature gift from the chef and a test run for a proposed entrée, such as a taste of Tahitian crab muffins, Pennsylvania Dutch cabbage rolls, or Bajun flying fish and christophene in Barbados. The sharing of finger fritters, hot crab puffs, marinated shrimp, nut nibbles, a shot glass of pepper confit, and quail eggs, such as those served on transoceanic voyages or at ambassadorial gatherings, ready the palate for the meal to come. Tiny cups of corn chowder

[Recipe: Pickled Pinwheels](#)

Soften one block of cream cheese and blend in 2 tablespoons of dill weed, 2 tablespoons of chopped pimiento or roasted red peppers, and 1 tablespoon each of chopped celery leaves and minced bread and butter pickles. Spread a counter with slices of chipped beef or thin Danish ham. Top each slice with a heavy smear of the cheese spread. At the center of each meat slice, place a pickle spear. Roll each slice over the pickle. Place in the freezer for an hour. Remove and slice each roll into 1/2-inch pinwheels. Top each pinwheel with a dab of olive mayonnaise and secure to a snow pea or endive leaf with a cocktail pick.

and Gruyère puffs served by wait staff encourage relaxation and informality

among friends and strangers. Venetian *cicchetti*, miniature sandwiches served with relishes, encourage bar traffic in the afternoon, a version of the American happy hour.

For residential guests, hosts circulate delicate canapés and roasted baby vegetables on trays along with flutes of champagne. At the Brown Palace in Denver, Colorado, an array of chocolate bites accompanies cups of herb or fruit tea. For televised football games and election nights, heartier fare declines in daintiness from predinner wisps of food to hearty snacks— marinated wienies on toothpicks, buffalo wings, and chips and dip.

See also: Crackers; Feasting; Finger Food; Snack Food.

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[Aquaponics](#)

The method of raising fish and growing plants in a sustainable, integrated system, aquaponics applies a simulated habitat to the controlled cultivation of organic fruit, herbs, meat, and vegetables. A combination of aquaculture (cultivation of aquatic organisms) and hydroponics (cultivation in water), aquaponics gained interest in the 1970s as a form of green farming. The system

constantly filters through sand and recirculates fluids that contain clean metabolites. Extension horticulture updates Chinese and Thai paddy gardening as adjuncts to carp, eel, and pond snail gardens and emulates the planting of reed mat gardens in Inle, Burma.

To reclaim wetlands, the Aztec cultivated *chinampas*, floating gardens that farmers anchored in lake bottoms as early as 1150 B.C.E. The Mexican rechin beds produced amaranth, beans, corn, peppers, squash, and tomatoes, along with medicinal herbs, maguey for beer, and grasses for weaving baskets and mats. The root systems of beds reaching 4 meters (13 feet) by 40 meters (130 feet) fed on sediment and sewage and flourished from constant soil moisture. When food plants matured, gardeners poled the artificial island to market at Tenochtitlán.

Essential to a life-sustaining aquaponic environment are added oxygen and the removal of slimy biofilm and particulates, which pollute and acidify the effluent. Within the biofilter, bacteria convert toxic ammonia and nitrites from algae and fish feces into nitrates, an organic plant food. Treatment with calcium hydroxide or potassium hydroxide neutralizes the acidity. Worms liquefy solid organic wastes into humus for use by fauna and flora. Gardeners can assess needs and inject fertigation—irrigation water containing soluble fertilizer—directly into the cycle.

Aquaponics contributes to the food web such ordinary edibles as fresh water perch and bass, saltwater char and tilapia, crayfish and prawns, and bibb and leaf lettuce, chard, and basil, all grown on rafts or platforms without pesticides. In addition to common garden vegetables—cabbage, cantaloupe, cucumbers, okra, onions, peppers, sweet potatoes, strawberries, tomatoes—the systems also intercrop ornamentals, particularly portulaca and roses. Plants that do poorly include carrots and potatoes, which evolve into unwieldy shapes without soil to guide their development. Specialty greens—basil, chives, spinach, taro, and watercress—adapt well to the flowing water garden. Application of ladybugs and wasps offsets the threat of aphids and whiteflies.

Polyculture and water reuse systems increase the variety and economy of truck gardens and lower the cost of fresh foods in winter months. Because of the efficiency of a closed-loop nitrogen cycle, aquaponic gardens use 2 percent of the water necessary to grow crops in soil and avoid the waste of nondissolvable nutrients. The method also suits communities that recycle treated sewage

wastewater.

Aquaculture wins converts because of its economical space needs. One acre (0.4 hectare) of space can yield 25 tons (23 metric tons) of fish and 50 tons (45 metric tons) of vegetables annually. By contrast, a steer raised for two years on 8 acres (3.2 hectares) of pasture yields only 75 pounds (34 kilograms) of marketable beef.

The concept of soilless indoor gardening shows promise for development in parched sub-Saharan Africa and in Barbados and the Virgin Islands, where crop space and irrigation water are scarce. In Australia and Canada, urban farming via aquaponics reduces the mileage that such crops as barramundi and cod travel to market, making local produce both cheaper and fresher. Gourmands question the flavor and texture of foods harvested from a closed environment. Another complaint, the rapid spoilage of aquaponic tomatoes, suggests a lack of vigor from vines grown in liquid rather than soil.

See also: African Food Trade; Fish and Fishing; Seaweed; Shellfish; Taro.

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[Arab Diet and Cuisine](#)

Spanning the Arab world from the Arabian Peninsula west to Turkey, Syria, Jordan, Egypt, Somalia, Yemen, and the Umayyad Maghreb, Arab diet and cuisine consists of a lively, palate-pleasing blend of textures, aromas, and flavors. Religious cookbooks from Mesopotamia dating to 8000 B.C.E. exhibited local enthusiasm for refined cookery of dugong, fish, shellfish, and turtles. Hospitality, a Koranic requirement, formed the bedrock of interpersonal relations.

Among the Bedouin, Berber influences coexisted with Arab cuisine. The roasting of thin sheets of dough over a convex metal griddle yielded a brittle bread, used as a utensil for scooping up dips and sauces. Loaves, broken by hand, accompanied sheep tail fat and curdled buttermilk with dates and toasted locusts for snacks. Large metal pans held several sheep carcasses for roasting whole. Cooks served festive fare to a group from a common dish.

Archaeological digs at Al-Zubara on the Qatari coast revealed a heavy meat and seafood diet prepared at low hearths from 4000 B.C.E. by pearl fishermen. At nearby Ruwayqa, date presses produced syrup for export. In Baghdad, the Muslim capital, red meat kebabs and spitted whole lamb spiced with garlic simmered over charcoal. The Persian *biryani*, a rice-based fricassee, combined spiced meat and vegetables with boiled eggs. The Indian influence added dressings of chutney and curry.

In the Middle Ages, dhow and caravan carried over sea and land the Ceylonese tea, Indonesian pepper, saffron, and sultanas sold in Persian Gulf *souks* (open-air markets). At the heart of the Arabian Gulf spice routes, emirs of Oman dipped hands in perfumed waters before seating themselves at low tables. Over incense, they conversed informally while eating olives or dates with the thumb and first two fingers of the right hand.

Meals began casually with Jordanian and Lebanese *mezes* (appetizers), consisting of baby spinach, melon cubes, olive paste, pickled turnips, sardines, and walnuts. A national dish, *masgouf*, a butterflied carp marinated with tamarind and turmeric, required a firebox and an upright roasting grill, on which the cook burned out the fish fat. For the freshest carp, diners ate picnic style on riverbanks with lemon and salt for seasoning. Since 2007, Arabs have rejected carp from the Euphrates or Tigris rivers because of war time pollution.

Today, the basic entrées of camel, chicken, and lamb gain variety and nutrition from combinations of goat's milk yogurt, olive oil and lemon juice, parsley with

mint, garlic, and blends of cinnamon, clove, coriander, cumin, nutmeg, and paprika. Tunisians prefer *harissa*, a table condiment of caraway and coriander seeds pounded with garlic, hot pepper, olive oil, and salt. Yemeni condiments add cilantro, fenugreek seed, and green chilies. Cooks sauce red snapper with a red splash—pomegranate mixed with tomato. Iraqi meat pies feature leavened dough and celery and scallions as complements to lamb or mutton.

Consumed with hot coffee or Yemeni cardamom tea, meals frequently begin with a base of bulgur or rice or



Algerian Muslims gather in the courtyard of a mosque to share couscous after prayer. Traditional Berber couscous—steamed semolina pasta covered with an aromatic meat or vegetable stew—has been a mainstay of North African cuisine since the 800s C.E. (*Thierry Zoccolan/AFP/Getty Images*)

[Recipe: Desert Salad \(Tabbouleh\)](#)

Combine 1/2 cup each of chopped lemon mint and parsley. Soften 1/2 cup bulgur by covering it with 1 cup boiling water and letting it sit for about 20 minutes—then drain and press out any excess water. Add one large tomato cut into small cubes, one minced spring onion, and one chopped cucumber. Dress the mixture with 3 tablespoons each of olive oil and lemon juice. Season with pepper and sea salt and serve with pita triangles.

North African couscous and *samoons* (wheat flatbread). Moroccans serve couscous, the national dish, with thick *harira* (chicken soup) flavored with cinnamon and saffron. Lavish menus combine medleys of chickpeas and fava beans with eggplant or zucchini and salads of cucumbers and onions or of sauteed dandelion greens or purslane.

Breakfast varies from light yogurt cream, dill, and olives with Somali *canjeero* (pancake bread) to lentil soup or chickpea stew, a Tunisian specialty. Palestinians set their morning tables with a shaker of *zaatar*, a staple seasoning of oregano, sesame, sumac, and thyme that accompanies foods served with sage tea. Following noon prayers, Palestinian diners favor mixed appetizers preceding basmati rice and lentils with meat and tomato sauce and a carrot salad. A dessert of baklava (paper-thin pastry with nuts and honey) or *basbousa* (a Carthaginian semolina tart) and frothy yogurt drinks refresh and round out the meal. After dinner, a fruit course features fresh peaches or oranges, an Algerian preference, or decorative Qatari cupcakes.

Palestinian snacks revolve around hummus (chickpea paste) and chili sauce. Desserts feature dates, figs, and pomegranates as well as green almonds and pistachios served with fruit juice and goat's milk or Algerian mint tea and *halwa* (hard jelly) cookies from the Maghreb. Palestinian fruit trays include apples and carob pods with Jerusalem cheeses. In Bahrain, fruit choices include bananas and mangoes; Tunisians offer apricots, cherries, and prunes. Yemenis prefer rice pudding. Dinner in open-air shops concludes with *sheesha* (sweet flavored tobaccos) smoked in hookahs, or water pipes.

See also: Cereal; Crusaders' Diet and Cuisine; Halal; Ibn Battuta; Ice Cream; Pasta; Street Food; Taboos, Food.

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Arctic Diet and Cuisine

On terrain where agriculture is impossible, Arctic dwellers rely on hunting and gathering for a well-rounded diet that suits their cultural and metabolic needs. For the Inuit of North America, the world's purest hunting society, a protein-and fat-focused regimen ranges from dried capelin and ptarmigan and kittiwake eggs to smoked bowhead whale and reindeer tongue. To transport fresh meat to camp, hunters rely on a backpack or a tumpline, a headband and dragline to pull the carcass through snow. An ulu, a semicircular carving knife, makes short work of skinning and dressing haunches.

A land-based meat from the musk-ox arrives at the table *tartare* (chopped raw). For vegetables, families save the stomach contents of browsing mammals and gather tubers and grasses as well as seasonal berries and seaweed, both sources of vitamin C. In the Arctic wetlands, evergreen rhododendron provides leaves for Labrador tea, a favorite Athabaskan drink. In Greenland, brewers turn angelica and crowberries into ale.

The circumpolar staple from the marine food web comes from the ringed seal and the seasonal harp seal and walrus. After harpooning a seal or narwhal, hunters secure a stock of food that lasts for months by preserving blubber and meat as well as edible skin for raw *muktuk*. In Greenland, cooks turn sea mammal meat into *suaasat*, a soup thickened with barley or rice and flavored with bay leaves and onions. The consumption of a marine-based diet heavy in

omega-3 acids and selenium protects indigenous peoples from prostate cancer.

Arctic cuisine is surprisingly varied. Ice fishing among the Siberian Nenet and the Alaskan Aleut yields char and polar cod and lake trout, which they prepare with mouse food, the tundra roots such as cottongrass that voles store in their burrows. For the Pribilof Islanders on the Bering Sea, dried salmon and eider ducks provide winter subsistence. The traditional consumption of seal blood and organ meats reputedly fortifies the body against cold weather. Diners share the kill by status, according male hunters first choice and women and children the remains. Inuit and Mackenzie River Inuvialuit villagers, including the elderly and disabled, receive an allotment, which they consume with fireweed greens and bannocks or frybread.

The fermentation of summer kill butchered into steaks requires one year for the meat to decompose in the ground, a dangerous preparation method that causes more than ten deaths per year from botulism. Called *igu-naq*, cached mammal meat contributes a treat to everyday foodstuffs. In Greenland, Inuit food preservers stuff a seal carcass with up to 500 auks and press the treat under a boulder for months until the birds decay into a thick gel, a popular entrée for birthday and wedding parties. The northern Swedish *surströmming*, a rotted herring dish, served with crisp bread and chopped onion, releases so putrid a smell that people eat it outdoors.

The Yupik of the Yukon-Kuskokwim delta west of Anchorage, Alaska, fill barrels with salmon entrails and heads and bury them for a week to make a delicacy. An Icelandic equivalent, *hákarl*, requires the pressing in sand and the hang-drying of a basking shark for up to 20 weeks to cure. A masculine repast, *hákarl* smells of ammonia. It pairs with *akavit* (literally “water of life”), a strong liqueur made from caraway and spices.

Berries add a fruity savor to meat and fish entrées. A favorite dessert, *agutak*, or “Eskimo ice cream,” blends the flavor of whipped fat or tallow with blueberries, cloudberries, cranberries, crowberries, or salmonberries. Around Kamchatka in northeastern Russia, Chukchi reindeer herders, like the Nenet of Siberia, pound into reindeer fat a similar dessert concocted from fish roe and bilberries or crowberries. In Labrador and Newfoundland, cloudberries are the basis of a wine for drinking with sweets and blue cheese.

After World War II, Icelanders popularized festivals of country fare called

thorramatur (winter foods). A buffet of native dishes and sour specialties includes pressed rams' testicles and singed sheep heads, as well as smoked lamb and seal flippers fermented in whey to heighten the tang. The spread features blood pudding and liver sausage as well as wind-dried cod and haddock with rye bread. Dishes come to the buffet in wooden *troggs* (troughs), an antique touch.

The cuisine of some 50,000 Northern Sami of Norway and Sweden as well as Canadian menus feature lutefisk, a gelatinous entrée of cod or pollock softened and cured with lye leached from birch ash. Dating to the Renaissance, the aromatic dish requires spices or butter to enhance the mild taste. Scandinavians celebrate Christmas and Easter with servings of lutefisk. For everyday eating, salt-fermented gravlax (buried salmon), a medieval recipe, offers a mix of dill and sugar flavors in thin slices served on crackers with capers and lemon. The marine diet appears to protect the Sami as well as northern lumberjack families from ischemic heart and vascular diseases.

A threat to Arctic survival, the environmental buildup of the pesticide dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyls (PCBs) flows north on current and wind to infiltrate the habitats of crustaceans and squid. Within the food web, refuse from industrialized Asia, Europe, and North America has destroyed birds and mutated sex hormones and immune systems. Seabird eggs carry the world's highest concentrations of the neurotoxin dichlorodiphenyldichloroethylene (DDE), a contributor to Alzheimer's disease, breast cancer, and Parkinson's disease. Studies of human breast milk at Baffin Island and Nunavik, Canada, in 1988 and in the Faeroe Islands, northwest of Scotland, in the 1990s revealed methylmercury in seal, walrus, and whale blubber.

Compounding the danger, the role of fermentation in sand and gravel introduces ground and water contaminants during fermentation. Among some 13,000 Chukchi on the Russian shores of the Bering Sea, anatomical studies find one of the highest hexachlorobenzene (HCB) and hexachlorocyclohexane (HCH) rates in the Northern Hemisphere. To save themselves from chemical poisons, Arctic dwellers turn more and more to a diet of land-raised beef, poultry, fruit, grains, and vegetables.

See also: Caching; Whaling.

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Art, Food in

Kitchen work in art has furnished culinary historians with a glimpse of kitchen gardening and cooking style and method from early times to the present. The pictures of a bride offering chocolate to the Mixtec king in the *Codex Zouche-Nuttall* (1051 C.E.) and the late-sixteenth-century *Codex Tudela* demonstrate how Aztec servers generated foam on ritual pots of chocolate by twirling swizzles in the liquid. Egyptian tomb art subtly praises the fruitful Nile culture by depicting bakers at the oven and wait staff carrying baskets and heaped trays to the table. Hellenistic vase art displays the various stages of cutting and winnowing wheat, trampling grapes, and harvesting and preserving olives, the three fundamental foods of the Mediterranean diet.

Medieval wall art features monks splitting wood for the fireplace and filling bowls with stew, an embodiment of the Benedictine rule requiring daily work and domestic chores that welcomed wayfarers to the monastery table. Miniaturist Jean Pucelle honored a full calendar of peasant home labors in *Le Livre d'Heures de Jeanne d'Evreux* (*The Book of Hours of Jeanne d'Evreux*, ca. 1327), a 209-page prayer book illustrated for King Charles IV of France. Medieval stained glass art bears similar imagery of Christian virtues, daily labor and supervision, the essentials of tending to family sustenance.

From the Renaissance, artists Lubin Baugin of France, Juan Sánchez Cotán of

Spain, the brothers Isaac and Jan Soreau in Germany, and Dutch master Cornelius van Ryck began spotlighting cooks in their milieu as artists of the culinary trade. As explained by food historians, these coded canvases contain the ingredients and implements needed for preparing a recipe or feast. In an ebullient woodcut by Italian scenarist Christoforo di Messisburgo-Ferrara from 1549, the glorification of entrées presented to a table set for nine captures the anticipation of diners and the pride of cooks in their profession.

Artistic Close-Ups

In precise period elements, art gives the viewer a detailed glimpse of preparing and consuming an era's gastronomy, such as Caravaggio's *Supper at Emmaus* (1601). An unidentified sketch of the industry of an orderly Tudor kitchen establishes a clear separation by gender of hearth cookery. While men loll and converse at table, three aproned kitchen maids clean game birds, skewer them on spits, and baste the carcasses as they roast on andirons over the fire. At the far edge of the scenario, a plate of fruit and a basket of carrots and greens draw little attention in a setting where meat and masculinity dominate the menu.

Hands-on work at stoves, hearths, and tables offers historians a picture of utensils, serving sizes, and accompaniments. An appealing display of sixteenth-century abundance, Vincenzo Campi's *The Fruit Vendor* (1580) presents a woman surrounded by crockery bowls of berries, baskets of fruits and legumes, plates of figs and nuts, an apron of peaches, and a piggin of grapes, from which she extracts a likely bunch. Around the outer edge, a cabbage, a bunch of asparagus, and artichokes and a woman in the distance lifting a basket of nuts extend the image of plenty.

In Annibale Carracci's *The Bean-Eater* (ca. 1585), a rustic diner leans toward an unadorned, long-handled spoon for a bite of black-eyed peas, an African import to Italy that he consumes with crusty rolls, scallions, a plate of greens, and a glass of wine. A contemporary, Paolo Veronese, painter of lavish, life-affirming historical and biblical scenes, outraged ecclesiastical purists with *The Feast in the House of Levi* (ca. 1573), a high Renaissance tableau of table riches. A decade earlier, he had adapted Christ's first miracle into a Mediterranean event for

Marriage at Cana (ca. 1563), a food festival bustling with shared dishes, servants refreshing wine pitchers, and a complex gabble exchanged from table to table among well-dressed guests.

Food pictures articulated an era's culinary sensibilities. Influenced by naturalism, Carthusian layman Juan Sánchez Cotán's *Still Life with Game Fowl, Fruit, and Vegetables* (1602) accents shadings, light, and color as well as texture and shape, elements of menus that delighted and satisfied diners. Like the camera's eye, the artist's hand captures the normalcy of foodstuffs in profusion. His mélange of humble but nourishing edibles in pleasing juxtaposition presages Spain's baroque realism.

One of the pervasive subjects of late Renaissance art, the still life accentuates a passive arrangement of produce on a table or window sill, along a kitchen counter, suspended from ceiling beams, or arranged in baskets, in cauldrons, or on platters. Diego Rodríguez de Silva y Velázquez's *Old Woman Cooking Eggs* (1618) overlays labor-intensive cookery with a subdued domestic tension common to seventeenth-century portraiture. The spare scene and strained profile of the cook particularize the act of brazier cookery in a peasant setting limited to common farm foods. Displayed in bold chiaroscuro, her use of mortar and pestle and stirring spoon require limited motions from a seated position. Velázquez's *bambochdas* (drinking scenes) and *badegones* (kitchen pictures), such as *The Water Carriers of Seville* (ca. 1620), highlight dignified, contented individuals set against somber earth tones of olive, silvery-gray, yellow, burnt umber, and black. He ennobles the humble with a mystery and drama that prefigure the impressionism of Claude Monet's *Luncheon at Argenteuil* (1873) and Anna Ancher's *The Maid in the Kitchen* (ca. 1883).

In *Kitchen Scene with Christ in the House of Martha and Mary* (1620), Velázquez excels at contrast, another side of drama and mystery. Drawing on the biographical details of Jesus' ministry from Luke 10:38-42, the painter illustrates the difference between sisters. The housewifely Martha pounds food in a brass mortar in preparation for cooking eggs and fish; Mary, in the inset at right, rivets her attention on the evangelist while allowing her sister to shoulder the kitchen work. The pairing illustrates the need of Christians for spiritual sustenance as well as earthly food.

Pieter Cornelisz van Ryck of Ghent produced *The Cook* (1628), a kitchen spread

in chiaroscuro. As the rather generous light travels from the lower left-hand corner to the upper right, it backlights a jumble of carrots, apples, grapes, and pumpkin and a braid of onions. At the cook's level lies a haunch of meat with cut side facing out; she bears grapes and cabbage in her hands. Above her shoulder, poultry hangs from hooks. The profusion of fish on a platter, a tub at the cook's elbow, and a plated ham to the rear attest to the household's prosperity and access to a broad menu, but the noncommittal expression on the subject's face leaves open to interpretation her opinion of the job.

A view of kitchen work from the servant's vantage point appears on Jean-Siméon Chardin's canvas *Scullery Maid* (1738). A deliberately bare-walled environment strewn with a heavy-bailed copper cauldron, warming pan, cylindrical crock, and short-handled bean pot frames a single gesture by a serving woman gazing absently at the scene. Neatly dressed in white cap, wide-sleeved tunic, wide skirts, and apron, she reaches into a cask for fruit or vegetables to fill a long-handled skillet. The absence of clear food shapes and the distant focus of her eye suggest a blur of tedium. A blue ribbon dangles a gold medallion from her neck, a symbol of validation of her repetitive chores.

Food Commerce

From a commercial perspective, an illustration in Denis Diderot's *Encyclopédie* (1745) captures the labor and teamwork of an eighteenth-century pastry shop. Division of labor placed each man at a particular post. To the left, the shop boy bears a basket of fruit. At the open oven, the baker extends a wooden peel toward items surrounded by flame. At the back wall, a laborer kneads dough at a wood dresser top. The most complex part of baking occurs at the center of the picture, where racks of game birds and a haunch of meat hang over the central workstation and a servant pots a huge meat pie. In the foreground, an ax lies beneath a chopping block draped with the lifeless body of a hare. More activity at a huge pestle and counter to the right indicates that professional baking in the eighteenth century required heavy effort from all involved.

In 1770, Huguenot painter Daniel Chadowiecki sketched an anecdotal street view of a Polish market. Amid pushcarts selling stringed instruments, dolls, and

wooden horses, the butcher offers splayed pig carcasses and loops of sausage and salami. The folk spirit of market day mixes strolling aristocrats among bumptious children and out-at-elbows fishmongers lifting their wares from four-legged tubs. Beyond women with market baskets and bonneted fruit sellers, the implement seller sits in the shade under a row of iron trivets amid tankards, bowls carved from layered wood, and huge wicker urns, the practical cooking equipment of every kitchen.

Late in the eighteenth century, English painter and engraver Francis Wheatley characterized the vigor of grocery sales on London streets. His popular series of folk etchings *Cries of London* (1795), exhibited at the Royal Academy, originally carried the title *The Itinerant Traders of London*. At the core of his vision labored the cooks, hawkers, and milkmaids of rural and domestic England. In one market scene, a basket of peas lies in the foreground, admired by an urban crowd after its early morning arrival by cart from the country. The juxtaposition reflects the dependence of city folk on imported produce.

Vasili Perov's *Tea-Drinking in Mytishchi, near Moscow* (1862) uses food to make grim social commentary overblown with prerevolutionary melodrama. While a fat Russian orthodox prelate stretches grandly at an outdoor table and stuffs his rounded gut with dainties and tea from an ample samovar, an attendant sips from a saucer behind him while a maid refills the pot from a ceramic jar and pushes beggars aside. Two ragged figures dominate the right side of the canvas with humbly inclined heads and outstretched palms. A barefoot child accompanies the taller figure, a blind, peg-legged veteran of the Crimean War, two of Russia's down-and-out in the decades preceding the fall of the Romanov dynasty.

French impressionist Edouard Manet turned wholeheartedly to kitchen and table still life in the 1880s. Vital and evocative in their details, his *Bunch of Asparagus* (1880) and *Still Life with Brioche* (1880) reprise the tender contours of vegetables bound with grocer's twine and awaiting the pot. Under a fluted brioche, the sparkling blue plate balances a single pink rose in full bloom and the perky ears and whiskers of the kitchen tabby. More dramatic, *Still Life with Salmon* (1880) produces delight in disorder with yellow lemons, raffia-clad wine carafe, and an imposing slab of fish on a bed of greens. Manet's works conveyed promise in the fragility of fresh food, provisions for the sturdy, sense-pleasing

meals on which his European contemporaries fed.

See also: Afterlife and Food; Egyptian Diet and Cuisine, Ancient; Medieval Diet and Cuisine.

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Asian Food Trade

The Asian food exchange coordinated a series of multiethnic handoffs of goods as foodstuffs made their way to other nations. From the 400s B.C.E., the Scythians maintained two centuries of trade with Greek markets selling cheese, mutton, and wheat. Cambodians supplied India with rice and livestock, which increased Indian Ocean exports from 100 B.C.E. China maintained a similar relationship with Mongolia by bartering in dairy products and livestock for resale. From the late 600s C.E., as Islam fanned out from its Arabian origins, commodities of aromatics, black pepper, horses, and sugar turned port cities into world markets. Safe conduct through lands and waters evolved through sharing of profits with pirates and savvy merchants in Aden, Calcutta, Canton, Hormuz, and Malacca.

From the Bay of Bengal, Coromandel, Gujarat, Malabar, and Sri Lanka, Indian maritime commerce distributed candied fruit, dried fish, ginger, pickles, salt meat spices, sugar, and tea across the Indian Ocean to the east through Malaysian middlemen. By land and sea, Asian trade involved power brokers in Constantinople, Venice, and Iberia. Redistribution in Portugal and Spain sped coffee and tea north to France and to the northern seas to the Hanseatic League, which formed at Lübeck, Germany, in 1159 to trade in rye, salt fish, and wheat.

As European cuisine moved away from heavy medieval spicing toward sugary foods, the Polish and Russians replaced the Dutch and French as customers for Asian cinnamon, ginger, and nutmeg.

On the way to England and France, alcoholic drinks, allspice, bay leaf, cardamom, ginger, rice, sesame seed, tea, and white pepper traveled by speedy caravel and camel caravans from southern China through the Middle East and the Baltic Sea to Poland and Russia. Merging goods from India, the Philippines, Thailand, and Vietnam, another avenue arrived at the Malay Peninsula and continued east to the Spice Islands and southwest to Borneo, Mindanao, and Sumatra. The fluid exchange of Vietnamese goods came under stricter control after 1471, when loose federations of river merchants along the Jiaozhi Ocean collapsed under tyranny by Dai Viet conquerors. To the east, Chinese trade with Luzon in the Philippines in the early 1500s extended commerce in birds' nests for soup, cinnamon, ginger, and honey.

Primary Sea-Lanes

In the age of voyagers, the encounters between Eastern and Western traders extended a lively inter-Asian commerce to the rest of the world. In the 1500s, on the shortest run between Calcutta and Macau, Portuguese explorers reported steady seagoing traffic in cardamom, oil, rice tamarind, and wine to Malacca. On a smaller scale, consumers rallied to exotica—areca nuts, durian, *jagra*, *maja*, and tampoy.

In 1633, the Dutch usurped Portuguese shipping and operated 4,785 vessels at dividends as high as 40 percent from cocoa, coffee, macassar oil, and rice. What Asian commerce lacked in sophisticated merchant capitalism, it made up for in manpower, its primary asset. The Strait of Malacca, the primary Asian emporium, formed a coastal “cosmopolis” of shared Java-based authorities over the sale of dried fish, pepper, rice, salt, and spices. In 1720, the Dutch lost commercial control of Bengal, Malabar, Persia, and Surat in northwestern India.

Through cyclical booms and depressions, piracy, and wars, local potentates at the Banda Islands capitalized on alum, bananas, camphor, mace, nutmeg, pepper, and sago cakes, a multi-use palm starch. A consortium set rates of exchange and

weights and measures and expedited port traffic and duty levying. Foreign dealers maintained year-round quarters and ware houses, which protected shipments during monsoons. Purchases from the Philippines added to the accumulated stock of betel nuts, coconuts, copra, dried meat, lard, rice, and sesame seeds.

Technological Advances

Beginning in the 1770s, clipper ships increased the speed of east-west trade from Malayan entrepôts to distant ports at the rate of 400 miles (640 kilometers) per day. The sleek schooners carried apples and ice to Asia and returned with allspice, cinnamon, cloves, coffee, ginger, mustard, pepper, rice, and tea. At Singapore, speculators dickered for betel nuts, cardamom, and red cane sugar, sold from Chinese and Siamese junks.

On August 29, 1842, the Treaty of Nanking opened Amoy, Canton, Fouchou, Ningpo, and Shanghai to entrepreneurs from Great Britain. The agreement gave the British a monopoly over half of global transactions in coffee, pickles, salt, tea, and wine. Lighters and sampans delivered tea chests around the clock for careful stowage away from salt air and sea water.

By the 1860s, the steel fleet of the U.S. merchant marine unseated Great Britain's hold on global commerce. In New York Harbor, the Great American Tea Company sold cut-rate Chinese and Japanese tea straight from the cargo holds. After the opening of the Suez Canal on November 17, 1869, food carriers lopped 36 days from the ocean route between London and Calcutta, metaphorically shrinking the globe and speeding Indian wheat to England at low prices.

The emergence of technological advances in milling, refrigeration, and food processing brought students from Asia to the Americas. With scientific advancement in canning, packaging, and crane lifting of goods stacked on pallets, Asian bottlers of flavorings and sauces and canners of seaweed and smoked oysters energized the food industry with new trends. After the agricultural lapses of World War II, the dissolution of European colonies increased opportunities for Asian growers of black and brown rice, melons, pineapples, and soybeans for tofu.

Jet travel introduced tourists to Indian curry and Mongolian hot pots; soldiers returning from postings in Japan, Korea, Vietnam, and Iraq developed a taste for sake, imitation crab, soy sauce, bamboo shoots, *kimchi*, *be-lachan* (shrimp spread), hummus, and *tagine* lamb pilaf. Long-distance commerce provided Asians more social mobility and gave female farmers opportunities for expanded agricultural markets, especially in postwar Vietnam. The expectations of consumers in industrialized nations increased demands for food security, genetic modification of crops, and the use of growth hormones, matters settled after 1948 by the World Trade Organization.

In October 2011, the 21-nation Asia-Pacific Economic Cooperation pledged to create the world's largest free-trade area. Members promised to fight protectionism and support green industries. The agreement focused on beef, dairy, eggs, grain, pork, soybeans, and turkeys and on competition by domestic catfish farmers with Vietnam marketing of the pangasius, which supplies 2 percent of the nation's income. By promoting seamless regional commerce, 600 CEOs from the region sought to overcome financial lapses caused by natural disasters. Specifics of their consensus included welcoming China to a stronger position in trade governance and a reduction of tariffs by 5 percent.

See also: Caravans; Clipper Ships; Coffee; Gama, Vasco da; Spices; Tea; Trading Vessels; World Trade.

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Athenaeus (ca. 170—ca. 230)

A Greek living in Egypt, Athenaeus of Naucratis gained fame as an observant writer on diet, health, leisure, and wellness. He was a product of Naucratis, a trading center in the Egyptian delta between Alexandria and Memphis. Like physicians Celsus, Galen, Rufus of Ephesus, Oriba-sius, Scribonius Largus, Asclepiades, and Anthimus, in response to public carousing, Athenaeus issued a treatise on more sensible lifestyles.

His 15-volume *Deipnosophistae* (*The Banquet Philosophers* ca. 190 C.E.) ignored Roman food fads and covered the Greek love of luxury and table camaraderie, which separated dining from the *symposion* (drinking). Athenaeus divided his text into topics: a book on food in Homer's epics and other literature, two books on bread and hors d'oeuvres, a chapter on dinner courses and music, a chapter on indulgence, another on flatterers and gate-crashers, two books on fish, another on meat and poultry, a book on gluttony and wine, another on cups, a treatise on behavior and courtesies, a book on romance and women, a chapter on desserts and music, and a concluding commentary on perfumes and wreaths. Permeating the text, citations from 1,000 authors attest to the author's meticulous research of primary sources, commentaries, and glossaries. He defended table courtesy by rejecting salacious jokes in favor of wit and riddles.

In a fictional dialogue with Timocrates set between the death of Galen in 199 C.E. and the death of Ulpian in 223 C.E., Athenaeus speaks in the first person of a feast at the home of the Roman arts patron Larensius. The text describes the *andreion* (men's house) as a place for communal meals where educated guests discuss varied topics, such as the plain fare consumed by Homeric heroes. For themes, the author draws from stage comedy and from public sexual mores, hedonism, and the use of aphrodisiacs, such as *kandaulos*, a hearty collation of stewed meat, grated cheese, and bread crumbs in gravy flavored with anise. Philosophically, the diners acknowledge the civilizing aspect of cereal, by which Demeter socialized bestial meat eaters and introduced table decorum and the sharing of communal platters. The speakers honor gastronomy and refer to a cook as a free man, never a slave or a woman, who achieves professional status as a food artist.

Among gustatory concerns, Athenaeus differentiated the types of food suited

to social classes, such as palm fruit for domestic slaves as opposed to the select hearts of palm presented to the slave owner. He classified 72 types of bread and introduced rare produce, including the arbutus fruit and the medlar. In references to regional cuisine, he enlarged on the breads of Sardis, lotus wine in Libya, Attic figs and small fry, and the seaside cookshops in Alexandria that sold sausage and sweetbreads. He referred to cooking contests in Sybaris, Italy, in 500 B.C.E. Under a food patent law, the winner gained commercial control of his entrée for a year.

Discussions bandied about individual responses to food as mundane as a plowman's lunch of bread and cheese and as foreign to Greek menus as dog meat and cicadas and grasshoppers as appetizers. As a symbol of luxury foods, Athenaeus named the Samian cheesecake. He had no respect for the gobbler who polished off the dishes of almond appetizers, and he demeaned the glutton as a "potbelly."

The tension between the Greek ideal of Achilles and Agamemnon and the effete gourmand infused discussion with the range of deviations from the norm. Athenaeus had to admit that macho men such as Ajax would lose stature if they valorized dainty dishes such as those admired by the Persians and Sicilians.

Athenaeus's subject matter never strays far from issues of masculinity. As his fictional discussion ebbs and flows, at a risk of seeming obsessed with dining, gastronomes of the privileged class display a passion for cooking and banqueting. They discuss obesity, health, food prices, and the service of condiments, pilafs, prized fish, and sauces. As models, the author mentions numerous recipe compendia, one on breads by Chrysippus of Tyana, another on salt fish by Euthydemus of Athens, Greco

[Recipe: Greek Sausage](#)

Mince 4 pounds of pork or wild boar with 1/2 pound of fat. Squeeze into the meat 2 tablespoons each of black pepper and fennel seeds and 1 tablespoon of chopped garlic. Chop the mix to a fine, even texture. Add 1 cup of red wine and squeeze into the seasoned meat. Force the mix into casings and tie the ends. Suspend sausages to air-dry for three hours. Fry in light oil, turning frequently. Serve with a sprinkle of vinegar.

Syracusan poet Archestratus's *Hedypatheia* (*Life of Luxury*, ca. 350 B.C.E.), and a collection by Mithaecus, the first Greek to compile a cookbook.

Athenaeus's recipes vary from stuffed grape leaves to cheesecake and Coan wine fermented in seawater, but he focused on meat cookery. He explained a concept of religious cookery in the stewing of meat for a sacrifice to the seasons. Unlike spit-roasting, stewing tenderized the entrée and brought out the best flavors. In another recipe, he explained the making of *muma*, a meat stew that began with minced meat cooked in animal blood and entrails and flavored with coriander, cumin, honey, pomegranate, poppy seeds, raisins, scallions, silphium, toasted cheese, and vinegar.

See also: Fermented Foods; Pork; Shellfish.

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[Australian Diet and Cuisine](#)

Australian diet and cuisine confirms the success of adaptation to a unique environment. Upon arrival to the island continent on January 26, 1788, the first English soldiers and transportees from jails and work houses found Aborigines surviving on hunting and gathering. The nation's first peoples preferred a diet dominated by honey and nectars, wild spinach, and such found protein as crocodiles, snakes, and witchetties, a large white grub easily grilled into finger food. For health, the bush people inhaled eucalyptus and tea tree oils and drank rock fuchsia tea to cure respiratory ailments.

From the highly romanticized bush tucker (bush food), the kakadu plum (*Terminalia ferdinandiana*) ranked as the world's richest source of vitamin C, ahead of quan-dong (wild peach) and muntry berries. Additional nutrients came from gathering abalone, beefsteak fungi limpets, and macadamia nuts. Aborigines also snared albatross and muttonbirds, robbed their nests of eggs, and caught crayfish, fish, goannas (monitor lizards), penguins, rats, and seals.

Aborigines collected paperbark for wrapping seed bread and meat portions for roasting in ground ovens. For food preservation, in Queensland, Aborigines air-dried tropical water lily roots and yams. They cached wild grain in hollow woodbins or tied *bunya-bunya* pine nuts in skin bags coated in muddy straw. Gatherers of cycad nuts, one of the world's most ancient tropical and subtropical foods, wrapped them in tea tree bark stacked in grass-lined trenches.

In a world apart from Aborigines, the English fed themselves temporarily on a two-year stock of cheese, dried beef, flour, oatmeal, and tea. Meanwhile, they accustomed themselves to apple berries (*Billardiera scandens*), emu and kangaroo meat, *kutjera* (desert raisins), parrot pie, reef fish, wattleseed, and wild raspberries and plums. When traditional arming floundered under extreme weather conditions, the pioneers developed expertise at raising cattle and sheep, two sources of a heavy dairy and meat diet. The importation of Chinese laborers for cotton plantations and gold mines in 1851 introduced Asian vegetables, particularly Asian greens, bean shoots, bitter melon, and bok choy, a brassica plant related to cabbage and turnips.

By raising apples, grapes, sugarcane, and wheat, colonists reverted to foods from the motherland, notably ale and beer, wine, and traditional sweets, such as apple tart, for which the English were famous. From experiences in the two world wars, bakers evolved a recipe for ANZAC biscuits, a mailable oatmeal cookie intended for the Australian and New Zealand Army Corps.

In the 1950s, Australia slipped its tether to England and became Americanized, the beginning of a cosmopolitan cuisine based on the U.S. passion for Chinese food. From the influence of Asia and Oceania, Australians balanced the standard roast-and-potato menu to include lamb kebabs, stir-fried leeks and mushrooms, river finfish and ocean trout, Malaysian pork rolls, and sliced cucumbers and onion in yogurt, a Middle Eastern favorite.

Aussies embraced *yum cha*, a dumpling feast from South China, and advertised

a local food craze, farmhouse cheese from Gippsland, Victoria. Pack and snack foods favored jerky, fried flake fish (shark), meat pies, native wines, and Vegemite, a bottled yeast spread that required no preparation. For bread, stockmen and trekkers baked damper, a flat soda bread cooked on hot embers or in a billy (camp oven) and eaten with tinned treacle (corn syrup).

History bore out the palatability of Australian wild foods. In the 1970s, the back-to-nature movement popularized local foods, a revocation of Victorian era snobbery about European edibles and outback inedibles. After a hasty dismissal of aboriginal wild food in 1788, islanders rediscovered such indigenous plants as Chinese yams, finger limes, lotus, saltbush, warrigal greens, and Australian cashews and gooseberries. Restaurants returned kangaroo tail soup to menus and reclaimed gourmet recipes of local produce and seafood, notably, mud crabs, stuffed emu, and crocodile tail with pepperleaf.

From the clear waters off New South Wales, one of the world's least polluted stretches of ocean, Australian gourmands reclaimed less familiar delicacies, Balmain

[Recipe: Rissoles on Buns](#)

Mix 1 pound of ground sirloin with two eggs, 1/2 teaspoon of black pepper, and 3/4 cup of Italian bread crumbs. Shape the meat into bun-sized patties. Dust with granulated flour or powdered gravy mix. Fry or grill the patties over medium heat until they are crusty and the juices run clear. Serve on burger buns with fried eggs or pickle relish.

bugs (fan lobster), yabbies (crayfish), and baked latchet (sea robin) with mussels and olives. In 2004, the television series *Dining Downunder*, hosted by innovators Benjamin Christie and Vic Cherikoff, introduced grilled plank salmon flavored with lemon myrtle sprinkle and paperbark smoke oil, two distinct native savors.

Australian outdoor cookery and shore meals, especially at Christmas, lean toward barbecuing prawns and steak. In place of the stereotypical ham or turkey, cooks serve cold cuts and gherkins, curried rice, and pasta salad. Carpetbagger

steak is a Sydney specialty dating to the 1950s, a beefsteak stuffed with oysters and served with fried eggs and Worcestershire sauce. For a simple lunch, shepherd's pie (ground lamb covered in mashed potatoes mixed with other vegetables) varies the usual beef entrée.

Yule dessert tables exhibit fruitcake, peach Melba, and plum pudding, a favorite holiday treat derived from England. Lamington cube cakes combine cream or jam filling with a topping of chocolate and coconut, best enjoyed with gourmet coffees. At Easter, cooks display the pavlova, or "pav," a passionfruit and kiwi dessert built on a bed of egg white and sugar meringue and named for Anna Pavlova, an early twentieth-century Russian ballerina.

See also: Barbecue; Cheese; Dried Food; Grilling; Insects; Nutrition.

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[Australian Food Trade](#)

Because of Australia's varied terrain and climates, the island continent markets a wide range of foodstuffs to world tables. When the English populated coastal Australia with convicts and soldiers in January 1788, the newcomers faced a constant struggle for subsistence. Cornish felon James Ruse of Parramatta claimed agricultural prominence in Campbelltown with his epitaph, "I sowed the First Grain," a source of subsequent colonial trade wealth. By 1795, flour milling of oats and wheat became the first source of island exports, followed by the sale

of biscuit.

Immigrant brewers, butter and cheese makers, and meat salters at Parramatta and Sydney sustained planting styles and foodways from the motherland. In 1819, the first 1,000 agrarians adapted a stubborn terrain to herding rather than farming and opened canneries to cure game birds and rabbit in brine. To feed themselves salt pork, Australians established a triangular trade, shipping salt from Hawaii to pork farmers in Tahiti, who sent salt pork to the pioneers. Following failures with distilling, investors made their first advance in 1830 with the export of salt beef to England, followed late in the decade with cheese and potted butter sales in California.

Success with cotton in 1842 added vegetable oil to Australian food products. In September 1846, food processor Staddon and Price led the island market in banana conserves and guava and leptoma (blue fungus) jelly. Dried apple slices from Tasmania in 1850 increased the export of pome fruit. A burst of pioneering in the 1850s by some 600,000 immigrants demanded more food farming from the province of Victoria. To feed them, George Peacock, a Hobart grocer, became the first to can jam from apples, berries, and pears.

Before the decline in the salt beef trade in the 1860s, industrialist Sizar Elliott anticipated a demand for tinned meat from his factory in Sydney. By 1869, the Clarence, New South Wales, meat shippers alone marketed 14,331 cases of canned beef and processed gelatin, meat extract, and tallow for export. Simultaneously, Robert McCracken's Victoria Meat Preserving Company of Melbourne filled orders for canned meat in Japan and in England for the Royal Navy and for Jewish kosher markets.

The Industrial Revolution in New South Wales extended opportunities for processing crocodile and kangaroo bushmeat as well as mutton, plum pudding, and fresh apples and pears, which W.D. Peacock transported from Hobart, Tasmania, by sea in cold storage. On February 2, 1880, the freighter *Strathleven* brought the first frozen meat from Melbourne and Sydney to London. That November, the SS *Protos* carried frozen mutton and refrigerated butter and cheddar cheese, colored with yellow-orange annatto (*Bixa orellana*), a food dye also used in ice cream.

Colonial imports became indispensable to England, particularly frozen berries and apples and chilled meats. For the safety of families, Australian firms

distributed instructions on the correct methods of thawing and cooking of raw meat. The success of Queensland meat markets resulted in competition with Argentine beef producers and a lowering of prices for the consumer.

As British agriculture declined, the working class profited from low-cost pickled and smoked beef, butter, cheese, mutton, and tinned fruit and fruit and tomato juices, which arrived in port from Australia and New Zealand in greater quantities than produce from Ireland or France. From 1890 to 1894, when Chinese laborers increased Australian food harvests, fruit and vegetables and butter imports to London alone rose in quantity from 643 tons (583 metric tons) to 11,070 tons (10,040 metric tons).

With refinements to Michael Faraday's ammonia compressor system, processing plants boosted the output of food in 1892 by adding fish to exports. In 1895, total exports of preserved meat to the United Kingdom reached 23,325 tons (21,156 metric tons), much of it directed to orphanages, schools, and work houses. Loosening ties to the United Kingdom, Australia extended its clout in world food commerce by dealing directly with other nations rather than through London middlemen.

In 1901, with Australia providing nearly 50 percent of British commodities, the island nation became a federal commonwealth. The twentieth century saw the rise of agro-markets for abalone, Asian herbs, lychees, nashi pears, olives, potatoes, poultry, and farm-raised salmon and tuna. The promotion of Asian vegetables added bitter melon, bok choy, Chinese celery, flat cabbage, garlic chives, and mizuna (peppergrass).

In 1908, the British Board of Trade appointed four commissioners to live in Australia and promote commercial opportunities, such as the tunnel dehydration of eggs, minced mutton, and raisins. Trade with India in 1910 produced an amicable swap of wheat for tea and jute, a source of Australian gunnysacks. Bags cycled back to the United Kingdom from 1909 to 1913 bearing 2.46 million tons (2.23 million metric tons) of wheat.

By 1925, after a drop of 15 percent in farm and herd labor during World War I, 95 percent of Australian exports consisted of produce. To hold a place among other advanced economies, the Australians raised standards and policy on food safety from allergens and chemical and microbial hazards, such as widespread spraying of apple, pear, and quince orchards with toxic Paris green (copper

arsenate) to control codling moth.

By 2010, the Australian economy depended on some 2,000 companies in the food and wine industries for nearly half its retail sales. At Sydney in September 2011, food purveyors displayed their goods at Fine Food Australia, the nation's largest trade show. The chief buyers, Arab and Pacific Rim nations, purchased baby food, baked goods, candied fruit, chutney and pickles, custard and milk pudding, dairy foods, desserts, honey, meats, milk, poultry, powdered drinks, sauces and soup, vegetables, and wine and cordials.

See also: Aquaponics; Markets and Marketing; Milling; Refrigeration.

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[Aztec Diet and Cuisine](#)

The foodways of the Aztec, viewed through the eyes of Spanish conquistadors, imbedded native culture with outlets for worship and the appreciation of savory native flora and fauna. The Renaissance encyclopedist, linguist, and Spanish friar Bernardino de Sahagún, the father of ethnography and culinary history, detailed for Europeans the lifestyle of the Aztec, including cooking utensils, beverages, and foods. In 1529, under orders of Charles V, Holy Roman Emperor, Sahagún posted to Tlalmanalco at Xochimilco in south-central Mexico. While cataloging language and food customs in the Nahuatl language, he compiled specific vocabulary for pantries, hearth cookery, kitchenware, and therapeutic herbs,

which he listed in his Nahuatl dictionary and grammar book.



A drawing from the *Florentine Codex*, compiled in the sixteenth century by Spanish missionary and ethnographer Bernardo de Sahagún, shows the Aztecs eating tamales for the midday meal. The dough was made with maize (corn), the staple Aztec crop. (*The Granger Collection, New York*)

Aztec bloodletting impacted their values and customs, including food gifts of eggs and turkey sprinkled with human blood. They made ritual stews from the hearts of slaughtered criminals or prisoners of war. Beyond cannibalism, they adopted the word *tortilla*, Spanish for “omelet,” to name the staple bread.

At the Tenochtitlán food market, street cooks prepared entrées; *curanderos* (herbalists) linked eating with curative nutrition. Sahagún’s encyclopedia, the 12-volume *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1540–1569), also known as the *Florentine Codex*, compiled details in parallel columns of Nahuatl and Spanish. Concerning favorite dinners, he incorporated spiced shrimp dishes, his preference for turkey wing tips, and the visions and dreams experienced by diners on honey and psychedelic black mushrooms, a common aphrodisiac. He remarked on the fattening of the wild peccary with stall feedings of acorns, cherries, corn, and roots.

A People's Diet

For the Spanish, foodways became a basis for understanding the Aztec. At court, staff set the emperor's table with 2,000 dishes. Entrées made for the emperor alone included whipped chocolate sweetened with wild honey, avocados and cactus fruit, and the *moles* (sauces) that flavored caiman, crayfish, dog, jackrabbit, quail, and lake and sea fish. Unlike the privileged aristocracy, peasants favored raw fruits and vegetables, a contrast to the meat-heavy, alcohol-rich Spanish diet. In the Tenochtitlán market, some 50,000 people came to examine baskets and gourd dippers, cutting tools made from volcanic glass, and the griddles and *ollas* (cooking jars) displayed and sold by potters.

Aztec dietary lore contained unique elements, such as the casting of bits of food and drops of *octli* or pulque, an alcoholic drink fermented from agave sap, onto the hearth before each meal to propitiate the gods. Crafters molded and painted idols from food. At the end of a ritual, worshippers ate the images. For Xiuhtecuhtli, the fire deity, and Huitzilopochtli, the war god, the Aztec made pastries and consumed them in the god's honor, a sacrament that paralleled the Christian Eucharist. A similar obeisance to a dead monarch required a four-day presentation of flowers, food, and tobacco. On the fifth day, Aztec subjects feasted and made speeches.

In times of famine, a prophet warned the people that those with plenty must tolerate seizure of their stores of amaranth, cacao beans, corn, and seeds to share with the poor. Out of compassion for the hungry, the ruler stopped collecting taxes. In fealty to the gods, the Aztec carried their families up the mountains and sacrificed their children to solicit rain and to make the prickly pears and amaranth greens grow, the grasshoppers return, and the gardens produce once more.

The *Florentine Codex* incorporated 1,800 illustrations drawn by Aztec scribes to capture the importance of sustenance to a culture bedeviled by attackers and drought. Central to native festivals and worship, corn in all its forms demanded reverence, sacraments, and hymn-singing to the earth mother, the giver of life. Vast storage facilities operated by food accountants and *pochteca* (distributors) mediated between urban consumers and outlying farms, where peasants used cacao beans as a medium of exchange. Book 10 summarized the bean-chili-and-

corn-based diet by describing the purchase of corn in city markets for making popcorn, tortillas, and a variety of tamales flavored with beans, eggs, fruit, and honey.

Kitchen Specifics

Although the Spanish demeaned the Aztec diet as crude and pagan, kitchen masterworks—frothy cacao and vanilla drinks, poultry stew, chayote and jicama, opuntia cactus pads, and duck egg and squash dishes—displayed expertise. One example of harmonic baking began with the kneading of amaranth seed into a loaf called *alegría* (joy). The *moles* featured chili and spices, a symphony of flavors still dominant in Mexican cookery. At the heart of table service, cooks poured cups of *atole*, a beverage made of parched cornmeal and chia, a gelatinous seed so valuable that the Aztec used it as currency to pay their taxes. More than taste or nutrition, their national foods imparted feelings of patriotism, heritage, and family.

Aztec cuisine figured in major life passages, particularly funerals and weddings. As part of the cult of the dead, the devout enshrined images and proffered tamales and turkey or dog stew to feed the spirit on its journey from earth. The ritual concluded with songs and toasts of pulque. As Sahagún's illustrations showed, girls of marriageable age learned from their mothers how to soak corn kernels in ash and water to remove hulls. Grinding involved kneeling at a stone metate and pressing the mano (roller) over dried corn until it broke into meal. By adding water to the flour and shaping into a palm-sized ball, the cook readied dough to pat out a thin cake for heating on a *comal* (stone griddle).

At the heart of Aztec cooking lay distinct flavorings— green, red, and yellow peppers and the cooking of frogs, grubs, lizards, and termites with chilies, tomatoes, squash seed, and savory herbs. The food sellers at the market stalls identified peppers by color and pungency and by use as pickles or with fish, newts, tadpoles, turkey, and smoked meats. To Aztec cookery, the Spanish newcomers added black pepper, cinnamon, coriander, olive oil, oregano, and parsley as well as almonds, bananas, barley, chickpeas, eggplant, garlic, grapes, lettuce, onions, rice, sugar, and wheat. From the blending of flavors emerged

Mesoamerican cuisine, a previously vegetabler ich cuisine broadened with the addition of beef, lamb, lard, milk, rice, and wheat and the blending of butter and cheese into rich cream sauces.

See also: Chicle and Chewing Gum; Díaz, Bernal; Insects; Las Casas, Bartolomé de; Peyote; Prohibition; Religion and Food; Sauces and Saucing; Tortillas; Yeast.

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B

Baby Food and Infant Feeding

Globally, the nourishment of infants and toddlers reflects the attitudes and means of individual cultures. The breast feeding of infants currently lowers the risk of dying in the first 12 months by 20 percent. Typically the decision of mothers, newborn feeding relied for eons on the birth parent or a wet nurse. The job of surrogate breast feeder rewarded donors with a serene life and abundant food.

Either the mother or the donor fed the child every two hours. In past ages, the first postpartum secretion, called colostrum or beestings, held such mystic powers that herders saved the colostrum from lactating animals for special needs. Human milk bolstered immunity and reduced health risks, particularly allergies, diabetes, and obesity.

For mothers of stillborn or deceased children, nursing another baby solaced the sorrow of losing a child. Among Native Americans, the sharing of breast feeding of community infants created a parental bond with all the tribe's children. In Malaysia and the Philippines, the employ of a wet nurse symbolized luxury and status. For what ever reason, the insistence on human sustenance strengthened the suckling babe through a diet of high-quality fluids that adapt naturally to the baby's needs and maturation.

For families choosing surrogate mammalian milk or supplementing breast milk for fretful or sickly babies, hard-spouted clay containers such as miniature Cypriot wine jugs from 2000 B.C.E. simplified infant feeding. A terra-cotta nurser shaped like a piglet from 450 B.C.E. suited a Greek mother, who filled it with a formula of honeyed wine. The Egyptians and Romans in 300 B.C.E. used blown glass for shaping feeding vessels. In the thirteenth century in northwestern Europe, a cow's horn capped with a chamois leather nipple served as an infant flask.

Solid Foods

Other nations standardized infant solids, the meals that sufficed for teething infants. In eastern Asia, homemakers first introduced rice gruel, followed by mashed vegetables and tofu as teeth emerged from infant gums. Japanese mothers extended weaning meals to bonito flakes, miso (soy paste), and seaweed. In India, Hindus and Parsis made a food ritual of Annaprashana, the introduction of rice porridge or a mix of milk, ghee, and honey to a baby at age six months.

In some cultures, the mother's chewing of solids macerated food for shifting to the child's mouth, often from tongue to tongue. Examples include the banana pulp that Ugandan mothers fed their babies and the chewed fish and heated water that Eskimo mothers passed to their infants from mouth to mouth. Choices of flavors affected the growing child, who established preferences as early as age two for indigenous plants, such as avocado, coconut, and pomegranate.

According to Thomas Phaire's *Boke of Chyldren* (1544), the first pediatric treatise in English, evil traits and an ugly complexion dated back to the "gyver of the mylke" who fed the individual in infancy. Renaissance mothers worried that substitution of goat's and sheep's milk could introduce coarse animal elements to the baby's hair and skin. For weaning, families made digestible, nutritious pap from barley, oats, or rice mixed with egg for spoon-feeding. In the 1700s, the addition of broth, butter, or oil produced panada (bread soup), a specialty in northern Italy.

Nature vs. Science

By the Industrial Revolution, mass production of infant food applied the scientific knowledge of nutritionists, who formulated feedings based on the analysis of mother's milk. Cookbooks outlined complex formulas from cream and milk, sugar, and water and listed pablum alongside menus for invalids. In 1845, New York inventor Elijah Pratt patented the vulcanized rubber teat. The concept replaced hard glass and metal nipples, yet doctors warned of the difficulty of sterilizing the inner channel.

For weanlings, American mothers ventured into cereal and meat, in part

because of a pervasive suspicion of fruit and vegetables as a source of cholera. In 1854, Bostonian writer Sarah Josepha Hale, author of *The New Household Receipt-Book*, advocated “gruel alone, or mixed with cow’s milk; mutton broth, or beef tea; stale bread, rusks or biscuits, boiled in water to a proper consistence, and a little sugar added.” For a sickly child, she prescribed arrowroot or sago boiled in milk and flavorings of cinnamon, nutmeg, sugar, and wine. Her varied list of sickbed meals included cornmeal or egg gruel, oatmeal, rice jelly, and stewed prunes, a treatment for fever.

[Recipe: Panada](#)

Toast 1 loaf of sourdough bread in the oven. Crumble the dry bread and add crumbs to one chopped onion in a frying pan coated with butter or olive oil. Sauté and moisten with water. Keep crumbling bread and adding crumbs to the water while stirring. Add 2 quarts of beef or vegetable broth and season with pepper and sea salt. Simmer for 30 minutes. Cool and whisk in three egg yolks, chopped green herbs, and 1 tablespoon of butter or olive oil.

Massachusetts natives Joseph Bardwell Lyman and Laura Elizabeth Baker Lyman’s *The Philosophy of Housekeeping: A Scientific and Practical Manual* (1859) corroborated Hale’s prescription. In a summary of the best “tissue-making” infant foods, they highlighted “Flesh, milk, eggs, and wheat bread.” Additional lists named fat-free servings of barley, cabbage, oatmeal, onions, and potatoes. Ironically, doubts about beans and fresh greens overlooked the most pernicious source of pathogens, the water supply.

The nineteenth-century German organic chemist Justus von Liebig emulated breast milk with proportional blends of carbohydrates, fats, and protein in a farinaceous food called Liebig’s Soluble Food for Babies. Historians have called his introduction of artificial milk the world’s largest uncontrolled experiment on humans. In 1867, his Registered Concentrated Milk Company in London shipped artificial mother’s milk to American and Europe an markets. He followed the liquid version with a powder of dried cow’s milk, malt and wheat flour, and potassium bicarbonate for reconstitution with milk and water. A letter to the

Medical Times and Gazette in 1877 proclaimed the formulation “a panacea to little children from birth, and in every rank of society.”

A Blow to Tradition

Simultaneously with the medicalization of birthing and the revolution in liquid formula and solid baby food, mothers abandoned centuries-old concepts of pureeing food at home in favor of scientific regimens. In 1867, for babies for whom cow’s, goat’s, or sheep’s milk proved unpalatable, German-born pharmacist Henri Nestlé of Vevey, Switzerland, formulated Farine Lactée (milk cereal), a powder of sweetened condensed milk and malted wheat rusks. In the 1870s, he marketed it in the United States as a weaning formula under the logo “Best for Babies.”

In London, Danish chemist Gustav Mellin improved on Liebig’s food in 1874 by inventing a portable, easily mixed powder that required no boiling or straining for dissolving in hot water and mixing with cold milk. Rich in grape sugar, the dry food received accolades from the *Boston Daily Globe*. Booklets accompanied the product to impress on women two adjectives, *scientific* and *modern*. In 1887, Mellin began marketing his breakthrough in Burma, Ceylon, and India as a scientific substitute for mother’s milk.

Traditionalists rejected liquid formula and fortified pabulum out of fear of contaminants. Mediators insisted that the weakness of boxed formula and cereals or canned fruits and vegetables lay in the addition of polluted water or milk. Aggressive advertisement massaged fears of early childhood death, which spiked to 20 percent in the 1890s in Europe during epidemics of cholera, diphtheria, enteritis, malaria, measles, pertussis, pneumonia, scarlet fever, and typhoid. Such verbal manipulations failed to pinpoint a common endangerment, a bottle or pap boat that became septic because the feeding channels were too narrow for thorough washing. By 1900, the reversible rubber nipple made it easier to sterilize nursers.

In 1896, Dutch industrialist Martinus van der Hagen’s Nutricia foods first commercialized prepared infant foods resembling mother’s milk. In Brunei, China, France, Malaysia, Singapore, Thailand, and Vietnam, he turned spin-off

brands Dumex and Sari Husada, Bambix cereals, and Olvarit organic mixed fruit and entrées into top international sellers. Advertisers depicted evaporated milk and ready-to-eat baby food as a convenience to the modern mother based on science rather than home preparations.

Selling Wholesomeness

Concern for purity drove the baby food industry, which got its start before World War I. Knowledge of sepsis caused families to demand milk from herds tested for staphylococcal and tuberculin pathogens. Shoppers also watched for signs of watering milk and additions of borax and formaldehyde, pernicious dairy preservatives.

In *L'Alimentation des Enfants Malades (Feeding Sick Infants, 1908)*, French nutritionist Maurice Péhu, a physician at the University of Lyons, advised mothers to adopt the slow simmering of beets, carrots, and spinach and straining the pulp into one quart of water. When similar manufactured food arrived in grocery stores, it was the brainchild of Daniel and Dorothy Gerber of Fremont, Michigan. The couple introduced jarred strained beef and vegetables soup, carrots, peas, prunes, and spinach in 1928 at six cans for a dollar. The popular canned food outsold Harold Clapp's formula, shipped from Rochester, New York, and distributed only by druggists since 1921. Sketches of the Gerber Baby in *Good Housekeeping* and *Ladies' Home Journal* increased the brand's market share. In one generation, the company turned *Gerber's* into a synonym for solid baby food.

Families began buying prepared foods in glass jars, a see-through container introduced by Beech-Nut featuring 13 varieties in 1931. The entrance of Heinz and Libby's foods into the infant market in 1935 did not lessen Gerber's dominance, which it still maintains. The market leaders added salt, starch, sugar, and preservatives with impunity until the 1990s, when the Food and Drug Administration mandated the listing of additives by percentage. As of 1998, Gerber topped all U.S. brands in customer loyalty. Heinz continues to dominate the market in Australia, Canada, Great Britain, Italy, and New Zealand.

Advances in Bottle Feeding

During the quarter century preceding World War II, breast feeding declined in the United States from 80 percent to 38 percent. Baby bottle kits offered the all-in-one convenience of a metal sterilizer and nesting basket for stovetop boiling. Mothers could clean bottles and nipples and prepare and store a whole day's feedings, poured into either round or hexagonal bottles. The lidded carryalls made by Therma Products of Toledo, Ohio, also held baby food packed with ice for outings and travel.

By 1956, when more than 50 percent of American infants drank home-mixed evaporated milk formulas, the La Leche League encouraged mothers to return to natural breast feeding for at least a year. The grassroots effort spread to Canada, France, Mexico, and New Zealand. By 1972, breast feeding began to advance at an average of 3 percent annually. The United Nations supported the effort in 32 nations.

Parents worried less about impure food after the introduction of boilable Pyrex nursers. The marketing of sterilized ready-to-eat formula in disposable glass bottles improved convenience. Fortification with iron and an adjusted calcium and phosphorus ratio bolstered nutrients in a basis of soy protein. Mead Johnson's Enfamil and Abbott Laboratories' Similac and other soy formulas solved some of the problems with animal milk and lactose intolerance and gained the trust of vegetarian families and women incapable of nursing their young.

Back-to-Nature Movement

The 1970s produced a revolt against industrialized, over-processed food and wasteful packaging. In March 1974, journalist Mike Muller of the British nonprofit War on Want issued "The Baby Killer: A War on Want," an exposé of the deception of developing world mothers, such as the women of rural San Salvador, where infants died at the rate of 50 out of 1,000. In the opening paragraph, Muller charged that the children who survived remained mentally and physically stunted.

A global uprising on July 4, 1977, against Nestlé's unethical merchandizing of Lactogen to nursing mothers shamed a respectable company for misleading mothers in have-not nations. By dispatching 200 saleswomen dressed in nurses'

uniforms, the company influenced women to switch from breast milk to the commercial formulas popular in industrialized nations. The missing link, literacy, made the campaign incomprehensible to the preliterate and semiliterate of Brazil, Chile, Jamaica, Jordan, India, Israel, Nigeria, Pakistan, and Sierra Leone. Subsequently, the faulty preparation of commercial foods and lack of refrigeration resulted in higher infant mortality rates from enteritis and ear and respiratory infection.

In a rebellion against overcooking and flavoring with salt and sugar and thickening with starch, mothers returned to breast feeding and to blending organic produce into baby food with food mills and processors. The World Health Organization (WHO) legitimized their concerns in 1981 by adopting the International Code of Marketing of Breast-Milk Substitutes. To increase income, baby food companies directed advertising toward African and Latino shoppers. In an effort to enhance breast feeding, Brazil in 1988 issued guidelines for marketing infant food.

Fortifying the Pantry

Because of inadequate formula mixing and contaminated water supplies worldwide, some 1.5 million infants died in 2001 alone. To save lives, WHO continued to advise mothers to breastfeed their infants for the first six months. As a substitute for human milk when the mother is weak or taking drugs for herpes, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), or tuberculosis, communities formed human milk banks to collect and dispense breast milk. Heifer International, a nonprofit poverty relief agency begun in Little Rock, Arkansas, gained support for combating malnutrition by giving poor families milk-producing animals—dairy cows, goats, sheep, and water buffalo—as well as chickens, ducks, geese, llamas, pigs, and rabbits as sustainable livestock.

Under the Child Nutrition Act of 1966, the U.S. Department of Agriculture established the Women, Infants, and Children (WIC) Program in 1972. The third-largest national food aid program, WIC distributed iron-fortified infant formula and cereal to some 88,000 applicants in the United States. By 2010, the number of

recipients exceeded 9.1 million, with a per-person average of \$41.45 per month in food assistance. Parents received more sustainable infant diet from jarred produce and meat and from milk formulas that provided complex fatty acids from egg yolk and fish for the development of brain and vision.

Alternatives to standard jarred food include the organic meals from Earth's Best, which appeared on grocery shelves in the 1980s. Designer entrées, available fresh or frozen from Bohemian Baby and Whole Foods after 2005, replaced savorless jarred baby food with such gourmet entrées as asparagus risotto and Tex-Mex beans and rice. In a \$3.6 billion annual industry, the creative pairing of fruit with rice pudding and meat stew with bay leaf enhanced a discriminating palate in infants. Multicultural choices introduced dal with cinnamon and lentils with coriander. Babies learned early to recognize celeriac and to appreciate the addition of ginger and shallots to dishes.

Globally, the baby food industry remains in its infancy. Russian mothers, especially rural peasants, spend more than 80 percent of their infant food allowance on imported jarred foods. Tanzania's Lisha brand imitates nineteenth-century creative efforts by selling local corn and soy beans blended with milk and supplemental nutrients. Farmers in Costa Rica and Honduras seized the wave of interest in more natural baby feeding by marketing pureed organic bananas and tubers to sell to African immigrants to the United States.

At the same time, disparities mock the advances in infant nutrition. Angola leads the world with more than 180 deaths per 1,000 live births, compared with Singapore, with the lowest ratio of 2.31 per 1,000 live births. For the Central and South American outback peasant, such as the Yanomami of the rain forest, baby food retains the age-old simplicity of fruit or meat mashed by hand and diluted with water.

See also: Allergies, Food; Cereal; Crackers; Liebig, Justus von; Sloane, Hans.

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Bamboo

A treelike member of the grass family common to the Caribbean, East and Southeast Asia, Pacific Islands, and the Americas, bamboo impacts world cuisine as a food and a versatile raw material for making cooking and eating utensils. A miraculous perennial that can grow as much as 39 inches (100 centimeters) per day, bamboo comes in 1,400 varieties.

In prehistory, Asians used bamboo leaves as food wrappers and strips to bind raw foods together for spit roasting. Aborigines of India collected sugar crystals from the stems for trade. Koreans roasted sea salt in sections of bamboo to leach out impurities. In the 1300s, Mongol nomads taught the Chinese their *kao* cuisine, toasting meat on bamboo skewers over charcoal grills. Cooks

Recipe: Vegetable Pork Rolls

Sauté 1/2 pound of ground pork in 1/4 cup of sesame oil. Rinse and sliver 2 cups of bamboo shoots and 1/2 cup each of chopped carrots and water chestnuts and add to the pork. Top with 1 teaspoon each of rice vinegar and soy sauce and lower heat to medium. Stir-fry for five minutes. Sprinkle on 1/4 cup of chopped curly parsley. Allow the mixture to cool and divide it into five portions. Spoon each portion onto an egg roll wrapper and roll the filled wrappers into cigar shapes. Brush with one beaten egg and bake for half an hour.

placed individual grills on tables, offering informal diners the opportunity to roast morsels to the desired level of doneness.

Bamboo is a cheap, lightweight, renewable resource. In Cambodia and New Guinea, kitchen staff heat greens and yams in bamboo tubes over fires; in Kerala, India, designers modify the tubes with baffles and use them to control steam arising from woks. At Vietnamese food markets, vendors of fishball soup draw customers by clapping *tok toks*, bamboo sticks that emit a hollow sound. Bamboo easily shapes into baskets for air-drying mushrooms and rice, beer carafes, brushes and scrubbers, canisters, chopsticks, cups and scoops, filters and mats napkin rings, shelving, sieves, vegetable steamers, and winnowing trays. As a fiber, bamboo weaves into a soft, antimicrobial fabric for curtains and table linens.

On farms and in courtyards, bamboo conforms to geometric shapes and arches to support espaliered and vining plants. In the mid-1900s, Kudo Kazuyoshi, a Japanese master of bamboo implement manufacture, designed creels for draining seaweed, transporting salt for pickling eels, and trapping and storing live fish in water.

One of the world's major food sources, bamboo produces edible sap and shoots that can be baked into rice pancakes, cooked in broths, grated over salads, mixed with other vegetables, pickled into a condiment, or fermented into wine. Shoots are available fresh or canned. Fresh stalks impart a distinct savor to rice, soup, or tea.

See also: Cantonese Diet and Cuisine; Dried Food; Hearth Cookery.

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Barbecue

An indigenous New World cooking method, barbecuing slow-cooks meat, usually a whole deer or hog, over a smoky fire.

On November 7, 1504, Christopher Columbus arrived back in Spain with details of Jamaican-style barbecuing. In 1542, Hernando de Soto's expedition along the St. Johns River, Europe's longest foray into native America, introduced Castilians to a Timucuan culinary specialty, barbecued hens. In the Caribbean in the seventeenth century, food writer Gonzalo Fernández de Oviedo observed the Arawak, Carib, and Taíno cooking alligator and fish on racks of bearded fig wood raised on saplings. During slow grilling, smoke from the wood fire drove off insects and halted putrefaction. On Hispaniola, pitmasters adapted grate grilling to whole cattle and pigs, dressed and split for maximum contact with heat. In Central America and southeastern Mexico, the Maya developed their own grilling method for iguana and turkey. A similar framework in Argentina called a *parrilla* accommodated haunches, tongue, tripe, and whole carcasses over radiant heat. Filipinos popularized the barbecuing of *criadillo* (bull's testicles) and the large intestines of pigs.

The first commercial U.S. barbecue, opened in Ayden, North Carolina, in 1830, sold smoked meat from a chuck wagon. In her epic Civil War novel, *Gone with the Wind* (1936), author Margaret Mitchell prefaced war and destruction with the barbecue at the Wilkes family's Twelve Oaks plantation, a symbolic outdoor repast that welcomed the county gentry to the cookery of Georgia domestic slaves. Before reaching the Wilkes veranda, the heroine, Scarlett O'Hara, spies barbecue pits that "had been slowly burning since last night. . . long troughs of rose-red embers, with the meats turning on spits above them and the juices trickling down and hissing into the coals." From political talk over plates of meat burst the announcement of war between North and South, a cataclysm fought over the nearly invisible slaves who cooked and served meals to Southern gentry.

After emancipation, black cooks migrating north and west took Southern barbecue styles with them and ate " 'que" on Juneteenth, a celebration of the news of slave emancipation on June 19, 1863. In 1907, Henry Perry, a Tennessee-born steamboat cook, introduced the cooking style in Kansas City. Because of the availability of cattle at railheads, barbecuers in Kansas, Missouri, Oklahoma, and

Texas favored beef over pork. After barbecuing over a mesquite fire, Texas-style steers fed large parties, such as the one featured in the film *Giant* (1956). Brisket arrived at the table in tender slices rather than chopped. Use of a closed pit produced a pinkish ring on the meat, evidence of a chemical change wrought by smoke. Side dishes included roasting ears of corn, baked beans, and thick slices of Texas toast.

Europeans developed a male-dominated cooking method of barbecuing meat and vegetables on a gridiron over hot coals or charcoal. In the late 1940s, Australians and New Zealanders embraced barbecuing for special occasions by grilling game or skewered chicken or lamb and sausages. The popular nationalistic gathering rejected the prim English diet of a Sunday beef roast and boiled potatoes.



A North Carolina pitmaster checks one of the whole hogs smoking in his barbecue grill. A slow-cooking method indigenous to the Caribbean and North America, barbecuing constitutes a diverse—and often competitive—subculture across the American South. (*Richard Drew/Associated Press*)

In other European colonies, cooks in Botswana, Lesotho, Namibia, South Africa, Zambia, and Zimbabwe developed the *braai*, a barbecue over a gas or wood flame of Dutch-style *boerewors* (sausages), rock lobster, and skewered *sosaties* (the Afrikaans term for spiced kebabs). Diners preferred their barbecue

with cornmeal mush, *chakalaka* (hot sauce), and chutney, called “monkeygland” sauce. The regional meal acquired its own holiday, National Braai Day, which it shared with Heritage Day every September 24.

Current North American tastes favor the backyard barbecue, popularly known as ’que. The method is relaxed, especially in warm weather, when outdoor cookery directs heat and odors away from the kitchen. At a traditional “pig-pickin’ ” in the Pork Belt, Southeastern Americans observe regional preferences for ribs or chopped fatty pork butt or shoulder.

The melting of fat into the flames gives the barbecue its distinctive aroma and succulence. Coarse chopping breaks down tough collagen fibers and produces a satisfying mouthfeel. For its homey appeal, barbecue became a focus of county fairs and political rallies. In 1991, producer Jon Avnet filmed Fannie Flagg’s *Fried Green Tomatoes at the Whistle Stop Cafe*, a Gothic comedy that depicts barbecuing of the villain as a way to hide the corpse.

All-male aficionados in the Piedmont Carolinas and Georgia construct barbecue pits from scratch or recycle fuel drums into hinged basin and lid. A natural competition emerges between “loggers” and “gassers” over the best fuel for authentic ’que. At church socials and Fourth of July community picnics, pitmasters slather a peppery, vinegar-based tomato sauce over pulled pork or chicken with a long-handled marinade mop. The sauce also seasons cabbage cole slaw, a standard accompaniment along with hush puppies (corn fritters), pickles, and sweet tea. South Carolinians add mustard to their sauce. Nearer the Atlantic Coast, cooks flavor marinade with brown sugar and molasses. Kentuckians massage seasonings directly into mutton for a presmoking dry rub.

Friendly competition, cook-offs at Kansas City, Missouri, Lynchburg and Memphis, Tennessee, and elsewhere in America feature the best regional recipes and techniques for the juiciest meat. Vying over the choice of hickory or oak hardwood or mesquite generates factions among grilling sportsmen. From these challenge meets have come a spate of barbecue cookbooks, most compiled by men.

See also: Amerindian Diet; Columbus, Christopher; Sauces and Saucing.

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Barter

A direct method of exchanging goods and services in a cooperative milieu, barter bypasses the use of currency as a medium of change. Bartering follows a number of patterns depending on location, need, and time factors. These may include:

- Pure bilateral exchange of goods.
- Pure bilateral exchange of goods and services.
- Offset of debt or obligation with a pledge of goods.
- Exchange of goods for a promissory note.
- Debt swap canceling obligations bilaterally.

In a simultaneous face-to-face swap, individuals or clans set the value of one commodity in units equal to an offering that differs in kind, such as a basket of camassia tubers for a swordfish or the skin and meat of three rabbits. In times of calamity, such as the collapse of monetary systems during depressions or war, only the trading partners can establish the fairness of a swap.

In a climate of distrust, the exchange may progress in silence, with one group leaving, for example, a stack of herbs or wax for examination. A potential customer may then leave an offering, such as bananas or sea bass. The first group may accept the offering or remove the herbs or wax from the site. This type of one-to-one deal suits soldiers on the march, such as the Macedonians under

Alexander the Great, who bartered for grapes and bread loaves with Bactrians who spoke no Greek nor recognized Greek coins. The invaders were more likely to receive fresh goods that had not yet gone to market. Unscrupulous Bactrians, on the other hand, could cheat soldiers by selling stale or mixed-quality foods to men who moved on to new bivouacs before examining the exchange medium for trickery.

More complex exchanges involve multiple commodities, for example, huckleberries and barley swapped for clay pots and obsidian knives. Among most North American Indians, trade in surplus corn and dried fish increased supplies of food for winter storage when red meat was scarce. The Cherokee fermented corn liquor, a valuable food or medicinal commodity on a par with Aztec cacao beans or Guatemalan *chicha*.

When the first white traders entered Plains Indian territory, they demonstrated the use of items unknown to their trading partners, such as fishing gear or work gloves to protect the hands from blisters. The Comanche rejected the gloves as well as lines and hooks, the Western world's method of catching fish one at a time. The ultimate good to both parties derived from mutual satisfaction. Thus the Comanche found use for imported grain baskets, which they paid for with deer pelts.

In modern markets, for the sale of goods and such services as plowing fields and bailing winter oats, non-monetary transactions avoid the paper trails of banks and tax accounting. By reducing an item to its base value, such as the use of a prize bull for freshening dairy herds, reciprocity avoids inflating yearly farm income or incurring a luxury or value-added tax such as that of Bosnia, Ireland, or New Zealand. For agrarian communities, deals arranged between relatives or fellow farmers enhance long-standing relationships and offer opportunities to lower overhead costs, for example, the seasonal use of a neighbor's corn picker in exchange for the shared trucking of soybeans to a grain elevator.

A downside of barter stems from the length of time required to establish worth and to negotiate conditions of transport and delivery, a major concern in Barcelona, Spain, in deals involving herd animals and perishable fruit and seafood. If the trading partners engage a third party or broker, involvement of an outsider lessens the savings by requiring payment for arbitration. Throughout history, dickering and haggling, such as the deal-making in the bible between

Laban and his son-in-law Jacob over white and black sheep, has resulted in resentment and grudges that sometimes escalated into personal and tribal vendettas.

See also: Animal Husbandry; Currency, Food as; Local Food Movement; Silk Road.

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Beans and Legumes

Beans and legumes, the world's first cultivated plants, have fed humankind since prehistory on complex carbohydrates, dietary fiber, and vegetable protein. Until the refinement of breads, dishes of bean, lentil, and pea porridge sustained much of the Mediterranean world and the Middle East. Culinary bean innovations began in Afghanistan and central Asia with wild crops and spread to Georgia, Pakistan, and India. In Africa, the viny hyacinth bean promoted rural welfare and land reclamation; Indonesians cultivated the winged bean, a trellised annual that yielded edible flowers, leaves, and tubers containing 50 percent protein.

During the Paleolithic era, milling separated kernels from pods and augmented the taste and digestibility of beans and grains for use in flatbreads and loaves. After 10,000 B.C.E., the Olmec and Maya balanced a corn-heavy diet with amaranth and beans, sources of complete proteins. Improvements in Neolithic or New Stone Age cuisine in southeastern Turkey in 9000 B.C.E. and Jericho in 8000

B.C.E. shifted focus from meat to cooked grains and legumes, which required clay pots for cooking. In Iraq as well as Chile and Peru, the bean diet altered lifestyles from nomadic herding to settled agriculture. Egyptians so revered legume nutrition that they chose beans as grave goods to nourish the dead in the afterlife.

Nutritional diversity placed beans at the center of global food intake. In 6000 B.C.E., Thai hunter-gatherers profited from fields of wild beans; by 5500 B.C.E., chickpeas nourished the Middle East. In the Far East, Chinese and Indonesian growers integrated a diet of fish and poultry with adzuki beans, rice, soybeans, and taro. The broad-based cuisine yielded a population spike as well as health benefits.

By 4000 B.C.E., the Andean Inca terraced vegetable gardens to produce beans and complementary flavorings from pepper and tomatoes. Around 2000 B.C.E., the grower in central China added soybeans to vital grain crops; a similar dietary advance in 1500 B.C.E. placed the pigeon pea at the disposal of cooks in Orissa, India. On the Fertile Crescent, the Akkadians dug canals to water bean fields. Around 950 B.C.E., Arabic author ibn Sayyar al-Warraq of Baghdad collected innovative recipes for beans cooked with grain and vegetables and for stews of lentils, rice, and white beans.

Staples

The incorporation of beans into basic diet stripped the legume of its cachet. Around 800 B.C.E., Hindus validated a standard diet of barley, beans, legumes, and lentils as adjuncts to rice, sesame, vetches, and wheat. For Greek farmers, dinners of beans, lupins, and pea and lentil soup featured vinegars and olive tapenade as table dressings. When legumes fell in prestige, only the poor in classical Greece served them in *etnos* (bean soup) dressed with vinegar and baked bean meal into loaves and sold split pea soup on the streets of Athens. Virgil's *Georgics* (29 B.C.E.) corroborates the ranking of kidney beans as a peasant crop.

Classic dietary advice ignored patrician trends and connected Roman staples—beans and lentils, bread, oil, olives, and wine—with sensible regimens and with noble clans: Cicero (chickpea), the Fabii (fava), Lentuli (lentils), and Pisos (peas). Families in Crete, Greece, Italy, the Levant, and Magna Graecia (lower Italy and

Sicily) relied on whole grains, legumes, and vegetables for meals and roasted *erebinthos* (chickpeas) for snacks. Roman legionaries packed chickpeas on marches to Germania. Nine days after a funeral, mourners spared the dead bellyaches by leaving bowls of broadbeans and chickpeas at grave sites. To avoid vindictive ghosts, impressionable Romans spit fava beans.

In the late fourth century B.C.E., encyclopedist Theophrastus of Lesbos, the “Father of Botany,” indicated the centrality of legumes to the Mediterranean diet and analyzed the nitrogen process by which legumes enrich soil. He evaluated potage made from fava beans and lentils and named chickpeas and lupines as famine food. In the next century, the poet Theocritus’s *Idylls* (ca. 270 B.C.E.) extolled the freshness of rural produce, including dinners of beans. Apicius, a Roman cook around 40 C.E., advised cleaning and soaking legumes, a means of tenderizing the thiamine-rich outer coat. He purchased beans only from Baiae and served them with celery, fermented fish sauce, and wine concentrate. His love of peas is obvious in nine recipes featuring peas seasoned with herbs and spices.

New World Beans

In the Western Hemisphere, Indians revered the “three sisters” of gardening, beans, corn, and squash, a xeric vegetable culture the Anasazi developed in the American Southwest from 1200 B.C.E. to 1300 C.E. South of the Equator, the Inca spread their tables with a healthful variety of amaranth, corn, lima and red beans, lupins, peppers, tomatoes, and tubers. For flavor, cooks served beans in oil and vinegar. On Dominica, Grenada, St. Vincent, and Tobago, the Carib shared with the Taíno the growing of lima beans, pumpkins, squashes, and starchy tubers in a single mound.

In Mesoamerica from the 500s C.E., the Aztec of Tenochtitlán toasted bean pods on a comal and simmered crushed beans to a paste in a clay *olla* (pottery cooking jar). Intercropping on *chinampas* (floating gardens) boosted yields of wild herbs, which flavored dishes of corn and beans. The *Florentine Codex* incorporated 1,800 illustrations drawn by Aztec scribes to capture the importance of beans and corn to the diet. From Spanish voyagers, Europe and growers acquired an enduring

recipe of red beans and rice as the basis for Cajun and Creole hoppin' John.

The fall of the Roman Empire left behind a regard for legumes in cuisine. During the rise of Constantinople, fragrant grain cereals and legumes filled the communal pot much as they had during Roman times. Because Christian dietitians from Egypt to Ireland dominated period nutritional research, monastery libraries contained up-to-date information on fava beans. Missionaries to China may have introduced *hu tou* (pod peas) in the 600s.

During the Nara era of the eighth century, when Japan turned to Buddhism, citizens embraced vegetarianism and cultivated rice along with grains and legumes. In Beijing, dealers traded in beans and dried fish, staples of China's extensive catering businesses. Shipping routes from Denzhou bore yellow beans farther east over the Yellow Sea to Japan and Korea. Simultaneously, in Western Europe, Charlemagne built the reputation of his kitchen at Aachen on a huge pantry of beans and chickpeas and homegrown peas. To ensure plenty, his accountants tallied provisions in the *Inventaire des Domaines (Domestic Inventory, 810)*.

Protoscientific theories validated the worth of beans. A layman's perception of complex bean chemistry in 1000 led to crop rotation, an agrarian technique that enriched soil with the rhizobial bacteria of legumes. In India, a detailed recipe in the *Lokopakara (For the People's Benefit, ca. 1025)*, a Sanskrit encyclopedia, described the soaking of urad dal (black beans) in buttermilk, providing a tenderizing application of lactic acid. In 1096 at the beginning of the First Crusade, Christian supply trains from Europe ensured military preparedness by transporting barley, beans, chickpeas, and lentils over 3,000 miles (4,800 kilometers) to the Middle East.

During the late Middle Ages, beans and grains continued to monopolize peasant fare. Society's bottom rung ate their legumes and rye crusts from wooden bowls, while the moneyed class bought tiny fresh peas in the pod rather than cheaper dried peas. In 1455, Europeans reported that the Senegalese grew kidney beans as the anchor of their West African diet.

The age of discovery rapidly spread bean varieties worldwide, introducing Europe to the black bean, butter bean, kidney bean, lima bean, navy bean, and pinto bean and initiating the growing of chickpeas and fava beans in the West Indies. In 1514, Spanish explorer Hernán de Cortés observed Mesoamerican

reverence for legumes when 50 Tlaxcalans offered them as gifts. He discovered that citizens paid their taxes in beans, corn, and sage. He marveled at idols shaped from ground legumes and seeds mixed with the heart blood of Aztec victims. North of the Mexican border, monoculture farmers coated slatted bins in clay to secure acorns, mesquite beans, and nuts, the basics of their daily intake. Trading in small and large beans from Lima, Peru, earned the name “lima bean” for a family of beans, including the baby lima and butter bean.

The Cherokee, Hopi, and Navajo excelled at cultivating corn and beans and storing them in baskets for use in bean bread and soup. Drought-resistant mesquite and tepary beans centered the cookery of Arizona Pueblos and natives as far south as Costa Rica. Plains Indians recommended cooking beans with honey, the forerunner of American baked beans. Algonquin succotash wed butter beans to corn and bear fat. The Narragansett varied ingredients with kidney beans. The Hidatsa of Montana cooked *mapee nakapah* (pounded mush) from beans and corn kernels.

In 1643, the Lenni Lenape moved closer to trading posts along the Schuylkill River to tend subsistence gardens of beans and cucurbits. For marketing, they stored beans and corn in woven sacks in caverns and subterranean caches. After 1670, the spread of Hudson’s Bay Company trading posts among the Inuit expanded their knowledge of Europe and legumes, which Florentine newcomer Catherine de’ Médici had introduced to France in 1533. In France, the popularity of peas continued to grow, making a late-night pea pudding snack a preface to bedtime.

Beans in Kitchen History

Essential to bean cuisine is the versatility of cooking and serving. In East Africa, mixtures of black-eyed or field peas wrapped in banana, cabbage, plantain, or roselle leaves fed families on handheld portions requiring no utensils. The tight bundles retained aroma and savor while steaming fillings. Farther north in Eritrea, Ethiopia, and Somalia, communal dining featured *injera*, a spongy sourdough flatbread, paired with *hilbet*, a creamy paste of fava beans and lentils, eaten taco style.

Throughout the Atlantic slave trade, legumes kept abductees alive. Aboard the slave ship *Hannibal* in 1693, the galley crew cooked *dabbadabb* (corn dumplings), varied three times a week by horse beans (*Vicia faba*), which relieved chronic dysentery. In 1707 at Cape Coast, Ghana, ships' cooks chose a familiar diet of beans, corn, and rum, which staved off seasickness. After slave sales, the typical fare in Maryland at the 2 P.M. feeding featured beans with buttermilk, cornmeal, molasses, and poke greens, the basics of Southern cuisine. Additional slave favorites—black-eyed and pigeon peas, broad beans, cowpeas, millet, and peanuts—became soul food staples. Weekend markets held by slaves in Antigua, the Bahamas, Barbados, Jamaica, and St. John offered lima beans, spices, and vegetables as fund-raisers to enhance island laborers' diet.

Research and technology advanced the bean business. In 1701, farmers abandoned broadcast sowing after English agronomist Jethro Tull invented a drill that directed beans and peas into three evenly spaced rows. At Monticello, Virginia, amateur agronomist Thomas Jefferson instructed his gardener to plant Ravenscroft peas, one of the 30 varieties the former president enjoyed.

For vegetable growers of Orange County, California, in the 1850s, support of railways elevated profits from the rapid distribution of fresh green and lima beans. For bulk in chili, prison and ranch cooks added black beans, black-eyed peas, great northern beans, and navy or pink beans. In Boston and New York, home economics classes enlightened immigrants on the cheap, nourishing protein available from dried beans. A nineteenth-century high-fiber favorite among Germans, three-bean salad in a sweet-and-sour sauce contrasted green beans and kidney beans with chickpeas.

During World War I, beans earned their reputation as food for the impoverished. Austrian social reformers Sophie Grünfeld and Hermine Kadisch opened kosher soup kitchens featuring menus of beans and soup to feed displaced persons, orphans, and refugees. Throughout the Harlem Renaissance, music lured whites to "speakeasies," where black bootleggers plied customers with a soul food combo of pinto beans and corn bread to soak up pot liquor. World War II airlifts set a precedent for subsequent humanitarian relief, which relied on beans as a lightweight and sanitary staple that most people eat.

Modern Uses

At present, more than 4,000 species of beans, lentils, and peas support peasant agriculture and supply 8 percent of the world's protein, usually in single-pot dishes. In the Philippines, the Hanunóo of southern Mindoro Island intercrop beans with betel, corn, and sugarcane. Eroded farmland in Kenya and Tanzania generates gullies in which wild legumes sprout and enrich the soil. Farmers in Angola, like those in South Africa, produce enough subsistence crops to import beans. Mauritius does a brisk business in lentils and soybeans from outside sources. On a higher economic level, Algeria tops Africa's demand for imported grain, lentils, and peas.

Restaurant cooks retail legumes as traditional ingredients. Satisfying Arab dishes combine chickpeas and fava beans with eggplant or zucchini. To achieve a sweet-and-sour savor, Szechuan cooks parboil tofu cubes with douban jiang paste, a spread of fermented and spiced broad beans. Raw food diners encourage meals of beans and grains, fruits and vegetables. For vegetarians, soybeans and tapioca mimic meat texture in faux crabmeat, tofu, and veggie burgers.

In Eritrea, Ethiopia, and Sudan, two affordable pulses, the chickpea and split pea, contain less protein than other legumes but suit infant and invalid needs for their digestibility, especially in bean mush. Unlike the poor of Africa's Horn and Bangladesh, consumers in Kenya, Malawi Tanzania, Uganda, and Zimbabwe are less eager to add the chickpea to their traditional cuisine. In South Asia, fried chickpeas add crunch and salt to snacks while bolstering nutrition. In central and western India, the drought-resistant moth bean generates sweet sprouts for salad and pairs well with pearl millet and sorghum.

The lima bean of Madagascar and the United States and the Mexican tepary make excellent meal extenders, as do the climbing scarlet runner, pole beans, and sugar snap peas. Caribbean consumers prefer haricot beans and pickled pigeon peas. Along the Sahel, the fringe of the Sahara Desert, beans sustain subsistence farmers; Tanzanians terrace their fields and market crops as mixed beans, a common source of soup.

Most legumes suit varied recipes, such as the mix of mung or soya beans with foxtail millet or noodles in China and Hawaiian jack beans baked in sugar and pineapple chunks. Southeast Asians sprout soybeans and sell bean crops to

commercial processors of bean cheese, curd, milk, sauce, and tofu. In Bulgaria and other parts of southeastern Europe, broad beans, dumplings, and cabbage accompany poultry and pork. To facilitate the breakdown of the outer legume coat in the stomach, cooks parboil and cook beans in fresh water or tenderize them with baking soda.

See also: New World Commodities; Pulses.

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[Beard, James \(1903-1985\)](#)

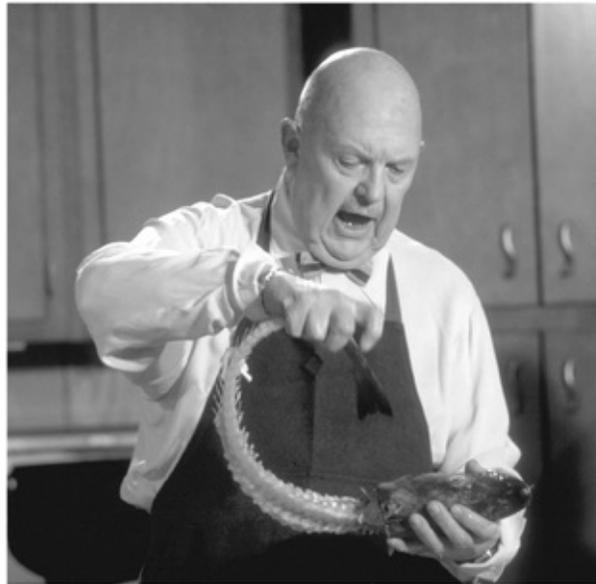
American culinary columnist, teacher, and cultural connoisseur, James Andrew Beard elevated North American heritage foods to gourmet status.

A native of Portland, Oregon, Beard was born on May 3, 1903. A chubby, energetic, and fun-loving child, he grew up under the influence of his English mother, Elizabeth Jones Brennan Beard, the innkeeper of the Gladstone Hotel, and her Chinese cook, Jue Let. In defiance of the gastronomic barbarities of Prohibition, he learned complex French cuisine made with raw artichokes and wine vinegar as well as recipes for Pacific Coast asparagus, berries, tiny Alaskan shrimp, teal, and crabs fresh caught at Gearhart beach. He described home dinners as diamond shaped—light on soup as an appetizer and sorbet for dessert, but bulging in the middle.

At the age of 20, Beard abandoned Reed College to study opera in London, travel with a theater company in France, and reconnoiter bistros to absorb the

cooking of fresh ingredients. He quickly discovered that an expensive dinner at Maxim's in Paris could not compare with the fare at country inns. Over a lifetime of wanderings, despite his fear of flying, he sampled exotica in Hawaii, most of the Western Hemisphere, Japan, and North Africa. At age 61, he credited palatal judgment and "taste memory" for recording the best flavors he encountered along the way.

While studying acting and opera in New York City in 1937, Beard supported himself by teaching English, French, and social studies at a private school in New Jersey. He joined Berlin-born cooks Bill and Irma Rhode in catering parties of Manhattan's "cocktail belt," the source of his first book, *Hors d'Oeuvre and Canapes* (1940). Beard's success in hustling cold cuts and vichyssoise curtailed his yearning to act in film and theater, for which he was too heavy. By the time rationing ended his catering concern, he recognized his true path as a food commentator and consultant, beginning with his employment by the Cognac Association, Cuisinart, and Sherry Wine and Spirits.



Chef and food writer James Beard, the "Dean of American Cuisine," brought gourmet quality to the preparation of North American fare. His books, TV appearances, and cooking schools have inspired generations of professional and amateur chefs. (*Lee Lockwood/Time Life Pictures/ Getty Images*)

Over the next 15 years, Beard earned the titles of "Dean of American Cuisine" and "Father of American Gastronomy." To promote North American food

heritage, he opened the James Beard Cooking School—first in New York City, then in Seaside, Oregon—and taught in short stints at civil clubs and women’s societies. To support his travels, he endorsed Green Giant canned vegetables and Mouton Cadet wine. At the Four Seasons restaurant in New York City, he introduced New American Cuisine, a showcase of clams, hearts of palm, lobster, marinated lamb, and pigeon that predated the natural flavors and seasonal ingredients of nouvelle cuisine. His enthusiastic showmanship and loyalty to regional recipes influenced chefs Julia Child, Craig Claiborne, and Emeril Lagasse as well as members of Restaurant Associates, a top--ranked professional food consortium.

In syndicated newspaper columns and 31 books, five of them posthumous collections, Beard covered a range of styles—barbecuing and rotisserie cookery, beer busts, entertaining, casseroles, picnics—and kitchen interests, including Italian food, bread and sandwiches, low-budget meals, fish, fowl and game, and pasta. His text of *Cook It Outdoors* (1942) introduced camp cookery and grilling as serious cuisine and turned the chef into the first American food luminary. In a newspaper advisory, he explained how he met kitchen emergencies by stocking his pantry with broths, clams, corned beef, garlic, olives, pimientos, salmon, sardines, and truffles.

During World War II, Beard worked in cryptography for the U.S. Army Air Corps and as a farmhand in Pennsylvania Dutch country before establishing port canteens for the United Seamen’s Ser vice in Marseilles, France; Panama; Puerto Rico; and Rio de Janeiro, Brazil. By 1946, he braved tele vision to produce America’s first cooking show for NBC, *I Love to Eat*, an effort to boost American gastronomy from the postwar doldrums with French techniques. Among his culinary broadcasting innovations, he tricked the viewer’s eye with ink enhancing the veins of Roquefort cheese and mashed potatoes posing as ice cream.

Diversification kept Beard afloat with freelance writing and cooking tours of France. His menus delighted guests at his Nantucket restaurant, Lucky Pierre on Steamboat Wharf; his food columns graced *Argosy*, *Gourmet*, *House & Garden*, and *Woman’s Day*. His unpretentious approach to kitchen work also brought more males into menu planning and cooking. In the 1960s, he studied Mandarin fare under Sun Yung Chiang in San Francisco.

In 1976, the 73-year-old chef's wizardry enlivened service at Windows on the World, a tower restaurant in the World Trade Center. Catering to private members from as far away as New Zealand and Russia, the grill flourished at chicken hash, crab and lobster cakes, ham with pepper sauce, lamb chops, and striped bass. He considered his success an agency of civilization.

Beard took seriously the plight of the hungry. At age 78, he established Citymeals-on-Wheels, a service for the homebound throughout New York's five boroughs. At his death, from heart failure on January 23, 1985, he left a legacy of scholarships from the James Beard Foundation to ready a new generation for championing the American tradition and to administer the James Beard Foundation Awards, known as the "Oscars of the food world." His house in Greenwich Village became a culinary workshop for chefs and restaurateurs. His impact on American cuisine presaged the locavore movement.

See also: Child, Julia; Grilling.

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[Beef](#)

The versatile, satisfying meat of bovines, beef supplies tables with savory protein food that cooks serve in individual slices of muscle and tongue, broth and stew, grilled kebabs and organ meats, dried jerky, and tripe soup. Wild beef consumption, as revealed in cave paintings at Lascaux, France, began with the aurochs, the ancestor of *Bos primigenius* (the first cattle), which thrived from

sub-Saharan Africa into the Middle East and India. Middens revealed bones of cattle, the first tame herd animals, which revolutionized agriculture.

After cattle domestication in 8000 B.C.E., herders in the Indus Valley domesticated two scions, the gaur and the humped, longhorned zebu, ancestor of the Burundi, Rwanda, and Uganda Akole-Watusi species of cattle. In central Africa, one zebu produced enough meat to feed an entire clan of Tutsi. In contrast to these endangered ancestors, a present-day steer raised for two years on 8 acres (3.2 hectares) of pasture yields only 75 pounds (34 kilograms) of marketable meat.

Beef and Early Civilizations

Beef earned respect for its nutrition and instant energy. In the Chihuahua Desert of Mexico around 7500 B.C.E., Paleo-Indian herders became more sedentary and fed their families on the meat of steers and the cheese and milk of dairy cows. Much of the era's meat curing involved extracting fluids through air-drying and salting. Smoking dehydrated moist muscle meat while exterminating microbes and killing insects and parasites. Following the defatting of muscle meat, trimming of bone and gristle, and salting of rumps and shanks, the Inca of Peru sun- and wind-dried lean cuts to produce *charqui* (jerky), a dense, lightweight travel food.

The importance of beef to civilization recurs in records and temple art. To ensure rapid work on the three pyramids at Giza, between 2575 and 2465 B.C.E., the pharaoh Khufu and his successors instructed overseers to feed stonecutters beef. Around 500 B.C.E., Darius the Great of Persia indulged himself by having whole oxen cooked for his table. Roman food writer Columella exclaimed in 55 C.E. on the Umbrian Chianina, a beef cow praised for high yield of 65 percent quality lean. In the first century C.E., the Japanese imported Wagyu cattle from Korea to supply marbled beef admired for its juicy tenderness. *Trysts*, the Scots term for stockyards, appeared in the British Isles as trading centers for French Charolais and Limousin, English Herefords, Scots Aberdeen and Angus, and Alderney, Guernsey, and Jersey stock from the Channel Islands.

From the 200s to the 600s, wealthy diners ate boiled beef seasoned with oil and vinegar, while peasants contented themselves with beef heart, oxtails, tongue,

and tripe. Sassanian cooks intensified flavors in ox haunches by steeping them in beef bouillon. Late in the seventh century, Muslims in Somalia celebrated Eid al-Fitr, the end of the Ramadan fast, with beef turnovers, an economical use of small cuts of meat. The Vikings predicated their cosmogeny on a primeval cow, Audumbla, the creator; Irish Druids sipped the broth made from a white bull and awaited dreams predicting selection of the next king.

Global Cuisine

Subsequent food history incorporates beef in significant cuisine developments. During a Mongol invasion of Moscow in the mid 1200s, Kublai Khan ate steak tartare, raw minced beef seasoned with capers that honored hardy Tartar horse men. The formation of the 12 Yeomen Warders of the Tower of London in 1485 preceded their nickname “Beefeaters,” after the kitchen of Henry VII rewarded his guards with beef, which roasters larded with bacon and cooked on iron spits. Under the influence of Catherine de’ Médiçi on French cuisine after 1533, meat carvers invented filet mignon (tournedos of beef), an innovative slicing and arrangement on a platter of the heart of beef tenderloin. Her kitchen staff achieved fame for beef Stroganoff, a popular dish that wed savory meat bites with sour cream.

In Tudor England, while peasants ate salt cod and stockfish, menus for the privileged spotlighted beef and game served with soft, white wheat loaves. After Elizabeth I dispatched explorers to New World colonies, British naval provisioners and traders raised demand on corned beef as galley staples and supplies for the privateers at Tortuga, Haiti. In reference to British settlers in *The Generall Historie of Virginia* (1624), Captain John Smith became the first New World observer to refer to beef preservation in the West Indies as “meat jerking,” the drying of a shelf-stable beef that remained edible at sea.

North and South American pastures extended open grasslands for the beef industry, which enriched itself on the commoner’s reverence for meat as a symbol of the good life. By 1749, natural interbreeding between bison and domestic cattle produced the first beefalo. The Plains hybrid enabled ranchers to produce hardier grazing herds to withstand extremes of drought and blizzards. In

fall 1766 in Rio de Janeiro, Brazil, British navigator Captain James Cook loaded fresh or jerked beef in the galleys of the *Endeavour* for an 11-year exploration of Pacific waters. In Hawaii in the 1800s, cooks abandoned whole fish entrées and showcased beef and dried beef jerky, which islanders called *pipikaula*, a traditional luau dish seasoned with ginger, honey, sesame, and soy sauce.

The broth from beef facilitated the planning of social reformers. In the late 1700s, British relief workers in London and Glasgow attempted to nourish the poor and homeless with daily servings of beef soup. Optician William Kitchiner's *Apicius Redivivus: The Cook's Oracle* (1817) compiled a soup recipe that flavored stewed beef strips and knucklebones with black pepper, celery, flour, leeks, salt, and split peas. Public distribution fed 600 families. London Reform Club chef Alexis Soyer summarized beef carvery that generated the leanest slices and tidbits for bouillon and stew.

In the Napoleonic era, the popularity of chateaubriand, a 2-inch (5-centimeter) cut of prime fillet served with béarnaise sauce, signaled a return of cachet to beef. Throughout the War of 1812, Caribbean planters profited from herd grazing and from contracting beef to the military. In 1843, the Puget Sound Agricultural Company, a subsidiary of the Hudson's Bay Company, distributed dairy products and beef to herd-poor locations in Alaska, Hawaii, and Tokyo. During the California gold rush of 1848, shippers sold miners beef, flour, and pork for \$60 per barrel. From Southwestern chuck wagons, grillers stirred up beef brisket stew for cowboys; barbecuers soaked gristly cuts in vinegar as a tenderizer.

Commercial Beef

At the height of the Industrial Revolution, when farmhands deserted rural Europe for urban factories, Baron Justus von Liebig foresaw the need for body-strengthening beef extract for factory workers who could not afford roasts and steaks. In 1865, processors of Liebig Extract of Meat in Australia, Brazil, and Uruguay distributed beef stock cubes later called Oxo, an inexpensive meat substitute and health tonic. Within a half century, Oxo and Fray Bentos Corned Beef, Liebig's salted beef and glandular extracts, turned a substantial profit along with the recycling of bones, hides, manure, and tallow as beef by-products. On

his expedition inland from Zanzibar, African explorer Henry Morton Stanley popularized Liebig's beef extract.

Before the decline in the Australian salt beef trade in the 1860s, food processor Sizar Elliott anticipated a demand for tinned meat, particularly from the military. By 1869, shippers from Clarence, New South Wales, exported 14,331 cases of canned beef and processed gelatin, meat extract, and tallow. Simultaneously, Robert McCracken's Victoria Meat Preserving Company of Melbourne filled orders for canned beef in Japan as well as in England for Jewish kosher markets and the Royal Navy. As the British meat industry declined, Australia's laboring class relied on low-cost pickled and smoked beef.

On the American and Canadian plains, military demand for beef during the Indian Wars heightened profitability for homesteaders and stockmen. Beef Barons shipped their herds to Chicago in 1868, when A.A. Libby & Company first brined 200-to 250-pound (90-to 115-kilogram) quarters and packed them in barrels and casks. In urban areas, meat wagoners distributed butchered beef to house wives, who made their selections in the street.

Established cattle ranches drove wild game farther from the Ute, leaving them dependent on government issues of dried beef. On the northern Texas border at Guthrie in 1870, Samuel Burk Burnett of the Four Sixes Ranch hybridized tough desert longhorns by crossbreeding them with British Durham and Hereford cattle sources of tenderer meat. Captain Richard King of Corpus Christi, owner of the 860,000-acre (350,000-hectare) King Ranch, collaborated with Burnett on drives to East Coast cities. Under protection of Texas Rangers, they exported American-bred Santa Gertrudis steers for the hotels and restaurants where diners demanded Texas beef entrées.

The first Midwestern threat to the New York meat market, Gustav Franklin Swift, Chicago's prime meat packer, conveyed freshly butchered beef to distant states. The transport of sides of beef rather than live cattle turned a seasonal business into a year-round bonanza for graziers and abattoirs. The immigration of Romanian Jews in 1872 added a new demand for thin-sliced pastrami, a delicatessen cut. In 1898, North American merchants on the Pacific Coast extended the output of fresh beef to Hawaii, Hong Kong, and the Philippines, where beef cuts appeared on inn and restaurant menus. A broader choice of meat cuts from polled (hornless) Scots Angus steers enabled chefs to refine their

recipes to exact standards of flavor and texture. American beef kings controlled Pacific meat export until the 1876, when Argentine shippers sharpened competition by shipping chilled beef from Buenos Aires to France by refrigerated vessels.

By World War I, slaughter houses distributed meat cuts to 25,000 communities by refrigerated railcar. Military demands, however, diminished supplies of cattle and meat products and caused U.S. government leaders to advocate replacing beef protein sources with whale meat. In Victoria, British Columbia, whale meat, called “sea beef,” replaced beef cuts in meat rolls, shepherd’s pie, steaks, and stew. New York restaurant menus featured fish as hors d’oeuvres, in *pot-au-feu* (stew), and salmon plank steaks until a postwar meat boom restored beef to the civilian market.

In 1926, long-distance refrigerated trucking linked consumers with fresh beef more rapidly and conveniently than trains. During the Great Depression, women on tight bud gets ranked grocery stores primarily on the color and smell of their beef. In the 1940s, the interbreeding of large-muscle French Charolais cattle with plains herds raised standards for low fat, taste, and tenderness. In Nebraska in 1952, Omaha Steaks vacuum-packed filet mignon, porterhouse, and T-bones for wholesale. Tex-Mex restaurants of the 1960s adapted original menus with skirt steak for fajitas and string beef, a cooked-off-the-bone essential of chili con carne and taco salads. In 1973, extending the connection between macho diners and beef, Swanson’s “Hungry-Man” dinners featured man-sized servings of charbroiled Angus beef sandwiches and beef enchiladas.

Asian beef cuisine made a global impact on menus. From the pervasive influence of Asian Indian cookery in the West Indies, curry dishes broadened beef entrées in Guyana, Jamaica, Tobago, and Trinidad. Tropical Indian turmeric tinged Sumatran *satay padang*, a skewered beef topped with a deep yellow sauce. Szechuan cuisine balanced the fish and seafood focus of Shanghai with the hearty beef cookery of the Chinese interior. Szechuan style hot pot sizzled beef in hot pepper oil in preparation for seasoning with blood, brain, intestines, marrow, and tripe.

The launching of Internet food clubs has made gourmet burgers, filets, pot roast, ribs, and steaks readily available. Kenya, Malawi, Tanzania, Zambia, and Zimbabwe have ventured into agribusiness by developing commerce in beef. In a

competitive environment, entrepreneurs import luxury cuts to satisfy travelers' demands for top-grade beef. The health conscious demand grass-fed meat, which contains fewer *Escherichia coli* (*E. coli*) microbes, herbicides, and pesticides than meat from cattle stall-fed on grain. In 1970, Mountain House, a division of Oregon Freeze Dry, first offered adventurers and campers zippered pouches of freeze-dried barbecue, beef stew, and chili for reconstituting in the wild.

British families began deserting the traditional beef roast in 1986, when bovine spongiform encephalopathy, or mad cow disease, first threatened meat eaters and spread to 14 European nations. Late in 2000 and into 2001, combined outbreaks of hoof-and-mouth and mad cow disease in Europe banished beef from home and public service and boosted sales of fish, kangaroo, ostrich, and vegetarian fare. Across Europe, beef consumption declined precipitously but temporarily.

See also: Animal Husbandry; Bouillon; Buffalo; Chili; Jerky; Szechuan Diet and Cuisine.

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Beer

The world's oldest alcoholic drink, beer, sometimes called "liquid bread," shares with bread its beginnings in the grain-growing Fertile Crescent in the Neolithic age. At the beginning of culinary history, both barley and emmer wheat served home brewers as a basis for alcoholic beverages. Syrians first cultivated barley in

8500 B.C.E. at Abu Hureyra, where women superintended fermentation in tubs.

The production of ethanol foam from the feeding of yeast on carbohydrates plumped bread and fermented beer. After failure at raising loaves, experimenters may have turned dough into the basis of the first brewing operation. The commercial preparation of sourdough required a bacteria-rich inoculum, or starter, from previous batches or from beer or wine. To keep the starter viable, preparers fed the mass fresh leavening. Celebrants of early brews generated bar ditties to John Barleycorn as well as hymns, myths, and paeans to common culture.

Ancient Brews

During the Bronze Age, Sumerians thrived on baked yeast bread and sipped thick unfiltered beer through straws to avoid bitter dregs. The growth of cities increased demand for processed food, such as beer at Ur. Around 7500 B.C.E., Sumerians achieved a 40 percent surplus of grain for brewing eight varieties of emmer beers and eight of barley. Protofarmers across the east-west axis of Eurasia naturalized barley and wheat, two self-pollinating, early-maturing founder crops. Stonemasons shaped grinding stones and mortars and pestles for reducing grain heads into powdery grist. After the development of Babylonian beer in 7000 B.C.E., farmers enhanced revenues by diverting malted grain to vats in which they made 26 different brews. By 3000 B.C.E., the use of 40 percent of Babylonian cereal grains turned beer into a source of new social problems, inebriation and alcoholism.

Brewing flourished among Celts, Chinese, Germans, Iraqis, and Persians as well as North Africans. Nubian brewers in Sudan inadvertently produced antibiotic beer that included rudimentary tetracycline, a product of grain stored underground and contaminated with *Streptomyces* mold. In Egypt from 3150 B.C.E., predynastic citizens at El Omari, Faiyum, and Merimbole beni Salame learned to brew from Sumerian natural yeasting recipes. They valued emmer wheat for the era's staple cuisine, beer and sourdough bread.

Brewing gained economic and social significance at Heliopolis, Memphis, and Thebes, where vats maintained the microorganisms necessary to processing.

Employers tended to pay workers in beer and groceries rather than cash. Around 1175 B.C.E., Ramses III endowed a large dole of beer and produce for artisans, priests, and tomb builders. On festival days around 1100 B.C.E., Egypt's royal pantry managers opened their store houses to the public for unlimited distribution of beer to all petitioners, a political method of assuaging malcontents.

Funerary cults validated four types of beer as nourishment for the afterlife. A liquid power food called *bouza* (beer) resulted from steeping crushed loaves and water into mash in large resin-lined jars. Bouza so anchored the Egyptian cuisine that children carried skins of beer to school for lunch. Nutritional manuals named beer as a treatment for depression.

Beer flavored with herbs permeated the greater Mediterranean grain consumption of Greece, North Africa Phoenicia, Rome, and Thrace. Herodotus's masterwork *The Histories* (ca. 428 B.C.E.), credited the vigor of Egyptians to their addiction to barley beer. Around 100 B.C.E. in Mesoamerica, maguey (agave) beer entered Mexican gastronomy. Mexican cooks fermented agave heart into *pulque*, an indigenous beer that also served as a standard analgesic for adults and children. In Central American deserts, pulque rehydrated the body and heightened senses.

In the first century B.C.E., the posting of Roman legionaries throughout Africa, Asia Minor, and Europe introduced Italian men to regional beers, including the barley brew of Britannia's *tabernae* (pubs). After 100 C.E., the Roman Empire tapped Silk Road commodities in Alexandria, Egypt, and generated the first multicultural cuisine, which innkeepers offered at road houses. For expedience, the Emperor Trajan posted legionaries along the east-west highway to secure trade in Roman staples in exchange for Eastern beer, dairy products, and meat.

Medieval Innovations

Beginning in the Middle Ages, British and Scottish beech hedges produced fragrant mast for smoking beer and cheese. Both adults and children drank ale and beer, a culinary history reflected in the Finnish epic *Kalevala* (1835), a compilation of rural folk tradition of Scandinavian fen dwellers. Physicians fed beer sediment to anemic babies and lactating mothers. Hospitality from the

eastern third of the Czech Republic featured artisanal beers and wines that influenced the cuisines of Austria, eastern Bohemia, Silesia, and western Slovakia. From the steppes west of the Ukraine, Russia's breadbasket, came cereal grains—barley, millet, rye, wheat—which reached markets as beer and grain products.

From the 800s C.E., growers protected their grain supply as a source of beer and bread. In *Capitulare de Villis* (*The Supervision of Manors*, ca. 800), an edict from Charlemagne, king of the Franks, ordered cleanliness in breweries, an industry that interested him personally. Moravian inns and pubs gained a reputation for hoisting a green bush to advertise a new run of dark beer, available at a reasonable price. Women embraced the tasks of the congregation kitchen with fervor, including soaking sour milk cheese in beer as a flavoring and preservative.

The Middle Ages introduced varied morning breaks with bitter hops beer, cheese, and oatcakes to feed laborers. In England, religious centers at Canterbury, Ely, Whitby, and Winchester gained fame for their brews, which bore alleged curative powers over leprosy and distension of the spleen. Priests substituted beer for holy water in baptismal fonts. At Burton-upon-Trent and along Italy's Po River in the 1000s, Benedictine and Cistercian monks, master brewers since the 600s, brushed cheese rinds with beer, brandy, brine, or saltwater to nourish mold, the type of crust and veining that distinguishes Brie and Limburger. The creation of a fuller morning meal elevated the worker's daily intake from two meals to three.

For good reason, medieval brewers fermented robust ales by building their vats next to bakeshops. By reusing starter from successful batches, they preserved zesty beer with flavorful yeast that initiated microorganisms in the next batch. Successful natural preservatives lengthened the time that ships could transport fresh kegs before they soured into vinegar. At a peak in the brewer's commerce in Holland and Belgium in the late thirteenth century, ships arrived up the Thames to London carrying as many as 200 casks of beer or wine each—in modern terms, 8,600 gallons (32,500 liters) per load.

Along the network of old Roman roads, organization of ale houses and coaching inns at the beginning of the Renaissance regulated brewed beverages. By the early 1500s, England's population of 2.7 million supported 17,000 pubs. In 1514, the Worshipful Company of Innholders unionized hostellers to better serve

pilgrims and travelers. In 1516, William IV of Bavaria issued the first purity laws limiting additives to the basics—malt, water, and yeast.

New World Varieties

The New World entered the global beer business in the early sixteenth century. In the Bahamas and Cayman Islands, the Carib fermented manioc pulp into beer. Manioc also supplied South Americans with *chicha*, a coconut-flavored beer made from fiber chewed by brewers and fermented with salivary enzymes. Early in 1537 at Sorocotá, Juan de Castellanos's *Historia del Nuevo Reino de Granada* (*History of the New Kingdom of Spain*, 1886) reported on the Chibchan intake of bread made from roots and chicha. In the Peruvian Andes, Lima natives honored the sun god by pouring corn beer into a holy fountain. Poet and chronicler Garcilaso de la Vega's *Comentarios Reales de los Incas* (*The Royal Commentaries of the Incas*, 1609-1617) summarized the use of beer for nourishing the poor. Inca house wives organized a food collection feast of berry-flavored chicha and donated pantry goods.

To the north, because of the deft leadership of explorer John Smith, Londoners profited from investment in the first English settlement at Jamestown, Virginia. In February 1608, settlers, indentured to the company for seven years, immediately began brewing ale and beer from New World wheat. The drinks provided citizens with low-alcohol, bacteria-free beverages fermented according to northwestern European tradition.

The British maintained their dependence on brewing as an adjunct to cuisine. During the reign of James I, Scots in fishing communities poached eel and salmon in beer. Under the Puritan governance of Oliver Cromwell in 1650, however, religious prejudice against spirits forced beer drinkers to accept coffee as a breakfast beverage. The return of the monarchy in 1660 reestablished beer drinking as a national pleasure as well as a business in colonial Canada. In 1751, artist William Hogarth's sketch *Beer Street* satirized London's beer-sodden tipplers as pudgy and contented. By 1765, brewers industrialized the production process with the technological advances of hydrometers and thermometers.

At a time when shipboard provisions included alcoholic drinks, brewers in

Alaska, Canada, New Zealand, and Norway flavored beer with spruce buds and greenery. Captain James Cook affirmed the belief that beer prevented scurvy. In 1766, during his four-year perusal of Newfoundland, his crew drank regular allotments of Canadian sugar-based spruce beer, an antiscorbutic known to Native Americans. The economical beverage was cheaper than lemon or lime antiscorbutics. Cooks on board the *Endeavour* brewed the drink from Sitka spruce (*Picea sitchensis*) using a recipe dating to the 1620s.

To feed Munich's 2,600 beggars, Count Rumford, an inventor and social strategist, established the Poor People's Institute in 1790. Calculating the maximum nutrition for the least expenditure, he concocted Rumford's Soup from barley, peas, and potatoes boiled in sour beer. To nourish the homeless, his feeding stations served beer-based soup three times a day. In a similar effort in Hawaii, after 1811, Andalusian horticulturist Francisco de Paula Marín became Hawaii's first commercial farmer and the first to recycle food by-products into beer. After 1832, German immigration boosted Cincinnati, Ohio, to a center of Teutonic beer. Honeymooners flocked to *Bier-stuben* (beer halls) and inns. Tipplers from the University of Cincinnati gathered at the beer garden established by taverner Louis Mecklenburg.

The Ubiquitous Drink

Among North American immigrants, Hungarian, Jewish, and Scandinavian drinkers remained committed to mild birch beer or to lager beer, an alcoholic beverage brewed at low temperature. The cultural and religious mores of newcomer French, Germans, Irish, Italians, Jews, and Poles to North America validated a healthy respect for brandy, beer, and rum, often as additives to sauces and fruitcakes and a normal accompaniment to meals. In the federal period at Atlantic Coast oyster houses, travelers and workers washed down raw and fried bivalves with corn and pumpkin beer, maple sap, and persimmon beer, a brew of fruit with wheat bran. In this same period, the immigration of Eastern European and German brewers to the United States replaced cider with commercial beer.

An American tradition from colonial times, fermenting grain into beer brought distinction to commercial brew houses from Boston to Salt Lake City, Utah. Cities

honored their brewmasters, coopers, and maltsters for distributing local beers, a mark of regional cuisine. In Poughkeepsie in New York's Hudson River valley, the Vassar Brewery dispensed 30,000 barrels per year. Some complexes, such as Bernhard Stroh's brewery in Detroit, Michigan; George Koenig Master Brewers in Cincinnati, Ohio; and Canandaigua in Victor, New York, recycled waste by making related products, including malt extract, near beer (alcohol content of 1 percent or less), and vinegar. To ensure quality, several breweries in St. Louis and San Francisco drew from spring water and stored kegs at a steady 55 degrees Fahrenheit (13 degrees Centigrade) above a system of sinkholes and natural limestone caverns or brick beer caves.



Modern American microbreweries, which produce high-quality craft beers and ales in relatively small quantities, follow in the long tradition of German, British, and Belgian artisanal brewing. (*Chuck Cook/Associated Press*)

On the American frontier, saloons became the major distributors of brews. Beer halls drew lonely drovers, miners, and teamsters to sources of camaraderie, drinking, and entertainment from billiards, card playing, darts, music, and prostitution. The licensing of stand-alone bars and grog shops suited the demands of their clientele, mostly males who focused their social lives on alcohol and

gambling. Drinks were cheap—a dime for a schooner of beer—and the ambience was limited to bare tables and chairs, brass spittoons, and floors covered in sawdust.

After the mid-1860s, an influx of ale, lager, malt liquor, pilsner, porter, steam beer, and stout drinkers from Czechoslovakia, Germany, Great Britain, and Poland created a beer culture that consumed 3.4 gallons (12.9 liters) per capita. The spirit of camaraderie and tippling increased tourism to festivals, such as American copies of Germany's Oktoberfest, the world's largest Volksfest, held in Munich, Bavaria, since 1810. To protect their interests during a period of temperance agitation, beer makers formed the U.S. Brewers' Association to lobby legislators and the Bureau of Internal Revenue, which declared beer a luxury rather than a common beverage. By 1889, the U.S. Treasury levied \$295,311,185 from brewers, a source of revenue to retire Civil War debts.

To satisfy local demand, German beer makers turned Brewerytown on the Schuylkill River in Philadelphia into the nation's prime brewing center. Farmers in Pennsylvania planted barley, hops, and soapwort, or bouncing bet (*Saponaria officinalis*), a common herb that stimulated froth. Malt houses stored bins of barley and malt, steeping tanks, and kilns. Wort masters left barrels of hops, malt, and water open in the brew house to encourage yeast to convert sugar into alcohol, the chemical change that determined flavor and alcohol content. By eliminating wild yeasts and spoilage bacteria, food processors applied pure spores to particular needs, such as pilsner beer, a pale Bohemian lager. After the Great Chicago Fire of October 8–10, 1871, Schlitz breweries in Milwaukee shipped barrels of beer and fresh water to survivors.

The first giant beer houses began operations in the late 1870s with Pabst in Milwaukee, Wisconsin, and Anheuser-Busch in St. Louis, Missouri. Industrialized brewing ensured jobs for bottle makers, brewmasters, grain vendors, keg builders, sugar refiners, yeast sellers, and van drivers, who delivered kegs directly to saloons and hotels. In St. Louis, Eberhard Anheuser, a prosperous German-born industrialist, established another U.S. beer dynasty and introduced pasteurization to protect Budweiser, a light Czech pilsner lager. For coast-to-coast transportation, his partner, Adolphus Busch of Kastel, Hesse, extended railroad ice houses and chilled freight cars. He introduced bottled beer, an innovative container that withstood humidity and climate change. By 1891, his vans had

delivered more than 1 million barrels per year.

Prohibition

By 1890, the average American beer drinker put away 13.6 gallons (51.5 liters) per year. At Chicago, where alcohol generated one-quarter of city revenues, the Anti-Saloon League and the Woman's Christian Temperance Union crusaded for 70 years, making temperance a home and family issue. The backlash against a male social outlet did little to halt public consumption of beer, but it did sanction xenophobia against German, Italian, and Polish Catholics, for whom beer and wine defined cuisine and culture for men, women, and children.

In Britain, after Scots botanist Robert Fortune increased the profitability of the tea plantations of the British East India Company (BEIC), tea took precedence over beer, which the gentry castigated as a crude breakfast drink. Until competition from private companies forced dissolution of the BEIC in June 1874, the British monopoly commanded the planet's largest merchant navy and controlled half of world trade in such commodities as tea and beer. Anglo bureaucrats and soldiers in India popularized British pale ale, a highly hopped beverage from All-sopp brewery at Burton, England, which beer makers in Australia and North America imitated.

From passage on January 16, 1919, until repeal on December 5, 1933, the National Prohibition Act, or Volstead Act, impinged on the American wine and beer industries, which lagged until the revival of single-label brewpubs and craft beers in the 1980s. Since the early 1970s, the standard Tex-Mex entrée menu offers fajitas, a sizzling plate of marinated skirt steak with grilled peppers and onions, washed down with Corona beer or tequila. Patronage of local food markets supplies artisanal beers, cheese, and sausage to regional cafés and bistros. At Cinco de Mayo venues, hosts distribute barbecue, tacos, and pitchers of Mexican beer. Polish cooks simmer Lenten soup from beer thickened with crustless rye bread rubbed through a sieve. On St. Patrick's Day, bakeries shape cakes like shamrocks; barkeeps tint beer green, the traditional color of hope.

See also: Alcoholic Beverages; Manioc; Prohibition; Temperance; Yeast.

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Biopiracy

Biopiracy is the current term for the age-old theft and control of indigenous fungi, livestock, plants, and seeds for commercial exploitation. Plant and animal swapping and interbreeding is indigenous to agriculture, beginning with einkorn wheat from the Caucasus to China, Egypt, Europe, and India. Historically, such thievery dates to 1473 B.C.E., with Egyptian Pharaoh Hatshepsut's importation to Karnak from Somalia of myrrh and frankincense, natural resins for aromatic teas.

The purpose shifted to economic domination with the bioprospecting of Christopher Columbus in the Caribbean, the source of chilies, chocolate, corn, manioc, pawpaws, and tomatoes for Europe. Sanctioned on May 4, 1493, by Pope Alexander VI and his Bull of Donation, the series of voyages under the aegis of Spain's Ferdinand and Isabella extended the power of the Vatican as a Christian right granted to the "vicar of God," a forerunner of the concept of Manifest Destiny. As a result of colonial privilege, Portugal cornered the market on cloves, but it failed to monopolize nutmeg from the Banda Islands. The potato alone, one of about 180 food plants taken from the Quechua of Peru, nearly doubled the European head count between 1750 and 1850.

Trade Monopolies

After Scots trader and planter Charles Alexander Bruce introduced plants and seeds of *Camellia sinensis* tea from the Singpho of Rangput, Assam, in 1834, the British East India Company (BEIC) launched a fleet of clipper ships to speed Indian beverages to Europe and the Americas. For the next 40 years, the British monopoly commanded the planet's largest merchant navy and controlled half of global trade in tea.

A similar transplantation occurred in Riverside, California, in 1870, when agronomist Eliza Tibbets grafted navel oranges (*Citrus sinensis*) from rootstock smuggled by missionaries from São Salvador de Bahia, Brazil. The successful orange, later called Sunkist, created an agricultural dynasty and fed the boom that advanced boxing, packing, and refrigerated rail transportation.

Monopolies grabbed unusual commodities for hoarding and profit—the Hawaiian taro, Thai jasmine rice, the breadfruit of Tonga, Colombian cassava, and the kakadu plum, bush tucker (bush food) among Australian Aborigines that the media billed as the world's richest source of vitamin C. In 1994, a Colorado firm hybridized and patented the Enola bean, a yellow legume that originated in Mexico; the lack of compensation robbed that nation of one of its biodiversified assets. A similar theft from Mexico occurred in 1999, when the Dutch corporation Quest International patented a substance found in *pozol*, a fermented corn drink invented by the Maya as early as 2000 B.C.E.

Looting began with the study of locations and climates for such marketable commodities. Late-twentieth-century prizes ranged from basmati rice and turmeric root from India and Pakistan to quinoa, a nutritious grain developed by the Inca of the Andes in Bolivia and Chile after 1200 C.E. In late April 2011, the illegal purchase of an Ongole bull from southeastern India represented an effort to increase milk yields at Brazilian dairies.

Ethics of Displacement

Only 10 percent of sustainable crops and livestock lie in the public domain. By patenting climate-ready crops capable of withstanding drought, flood, heat, and

salt, such “gene giants” as Bayer, BASF, Ciba-Geigy, Dow, DuPont, Hoechst, Nestlé, Novartis, Syngenta, and Unilever claim rights to 77 percent of the foods of the future.

From the world’s living treasures, scientists engineer and patent seeds, such as genetically altered soya and canola, an ingredient in confections, cooking oil, dairy products, ice cream, and margarine. The legal claim privatizes the plants as intellectual property and halts stock interbreeding and seed exchange, an essential among the wild rice growers of the Minnesota Chippewa and corn farmers in South Africa.

From these limitations have arisen international disputes between Japan and South Korean over *kimchi* and between the European Union and South Africa over grappa, a brandy first distilled from skins and pulp in Italy after 100 C.E. Compounding such ethical infractions, biopirates collect communal agricultural practice from shamans and villagers, an oral tradition of propagation and use. For example, the French company L’Oreal markets kava, a Fijian ceremonial beverage, to treat hair loss.

Hunting Grounds

Some 90 percent of native biota (flora and fauna) lies concentrated in the subtropics and tropics of preindustrial countries, most at the equator or in the Southern Hemisphere. Of the choice zones in Brazil, Congo, Costa Rica, Gabon, India, Indonesia, Mexico, the Philippines, and South Africa, Mexico contains 34 ecoclimates and an estimated 14.4 percent of the globe’s living species. Historically, Mexicans domesticated 118 plants, notably corn. The countries most eager to control these living organisms include Australia, France, Great Britain, Germany, Holland, Japan, and the United States. Once companies develop these resources, the people in the original habitat lack funds to purchase the refined products.

Africa’s wealth of edible plants and marine life dominates the cases of biopiracy currently under adjudication. Since 2000, eight varieties of groundnuts from Malawi, Mozambique, Nigeria, Senegal, and Sudan introduced wilt-resistant strains to farmers in Argentina and the United States, who paid nothing for

appropriating the seed. In 2002, *hoodia*, an appetite-suppressing cactus valued by the Khoi and San bush people of South Africa, returned royalties from Pfizer, a British firm. Pfizer faced criticism for offering an unfair royalty in contrast to the plant's value for the control of obesity.

Because trademarking threatens the even distribution of nutrition worldwide, the United Nations continues to uphold food justice by thwarting the patent abuse that strips smallholders of food sovereignty. At a UN convention in Bonn, Germany, in 2008, the Coalition Against Biopiracy exposed theft by bestowing the Captain Hook Awards to shame capitalists for "pillaging the commons." Another effort in Norway, the Svalbard Global Seed Vault, completed on February 26, 2008, isolates seeds that existed before genetic modification and monopolies.

See also: Genetically Modified Food; Tea.

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[Biscuit](#)

A ubiquitous travel bread for armies, navies, and expeditions, biscuit achieved its status as hardship rations for its stability on land and sea. Derived from Latin for “twice cooked,” biscuit, called *biscotti* in Italian and *bizcocho* in Spanish, supplied pantries from ancient times with a clean, hard cracker. Egyptians baked the *dhourra* biscuit from millet and sorghum, a cheap sustenance for the underclass. Greeks used barley and chickpea flour, which they oven-dried and made chewable by soaking in oil or wine. The unleavened sea biscuit, or ship’s biscuit, a dehydrated wafer of flour and water, earned the name *hardtack* for its toughness.

A recipe by culinary expert Apicius described the boiling of wheat flour for drying into hardened bars and serving with honey and pepper. In 77 B.C.E., Roman encyclopedist Pliny the Elder admired the bland biscuit for its impermeability by dampness and weevils. For military hardtack, legionary cooks double-baked *buccellatum* (biscuit) to issue to legionaries as *panis castrensis* (camp bread). As field pack food, the cracker traveled the Roman Empire, from Britannia and Germania to North Africa and Asia Minor.

Medieval Forms

Delivered in barrels, medieval biscuits anchored the hardy meals of the Irish and Scots; a lighter, more palatable variety fed Iberians. After 1189, Richard I, the Lionheart, departed on the Third Crusade with stores of “muslin biscuit” made from barley, bean, and rye flour. At the face-off with England by the Spanish Armada in 1588, Royal Navy recruits subsisted on a daily ration of a gallon (3.8 liters) of ale and a pound (450 grams) of biscuits, which consumers softened in brine, broth, coffee, milk, or wine. Subsequent fleet activity required stops at bakeries in Bombay and the Cape of Good Hope to replenish the ships’ biscuit supply.

The French, who called their hard soldier’s ration *pain biscuité* (twice-cooked bread), declared 3/4 pound (340 grams) of hardtack equal in nutrition to 1 pound of bread. They depended on it for a storable war time food that remained edible for 30 days. Germans ate biscuits with stout to curb insomnia and biscuits soaked in wine to lessen gastric distress. Australian Aborigines and drovers cooked

“damper,” an unleavened bush bread heated on a baking stone in an earth oven. Another culinary method involved wrapping dough around sticks for cooking over a campfire and eating with smoked bacon.

Later History

British biscuit, baked in Carlisle, Deptford, Edinburgh, London, Norwich, Plymouth, and Reading, derived from a pressing machine invented in 1844 by T.T. Grant, storekeeper of the Royal Clarence Victualing Yard, Gosport. The device turned out wafers at the rate of 8,000 tons (7,300 metric tons) annually, each stamped with Queen Victoria’s insignia. The single item formed a profitable export to Labrador, Newfoundland, and Nova Scotia as well as military supply to soldiers stationed in Cuba and Jamaica. Ships’ surgeons treated dysentery with biscuit jelly, a boiled concoction of biscuits, cinnamon, sugar, and wine.

Captain’s biscuit, a higher grade of wafer, earned more respect for its incorporation of butter, refined flour, and salt and for grilling into deviled biscuit, an hors d’oeuvre topped with anchovies and a cheese and mustard paste and peppered with cayenne. In 1771, Captain James Cook reported his biscuit supply remained edible for more than 36 months. Inmates in his brig survived for 30 days on nothing but hardtack. Sailors declared that the sound of teeth chewing sea biscuit resembled beans in a coffee mill.

In colonial North America, Theodore Pearson industrialized biscuit in 1792 at a bakery in Newburyport, Massachusetts. Along the New England coast, cooks made clam chowder by thickening cream-based clam soup with unsalted hardtack. On the frontier, families depended on bulk shipments of biscuits, dried beef, flour, grain, and salt. Shoppers snapped up fruit and sugary delicacies to enliven the daily cuisine of *pisco* (small birds) and tasteless wheat hardtack, made palatable by soaking in gravy, milk, or water. Alaskan camping and survival rations contained pilot bread, a high-energy biscuit served with applesauce and peanut butter.

By 1840, stamping machines increased biscuit making to use some six barrels of flour per day. Efficiency lowered the price for miners during the 1849 California gold rush and for work house inmates. Indians confined to desert

reservations survived on canned beans and hardtack. At Fort Hays, Kansas, soldiers deserted because of cold, hunger, and illness from eating only bacon and hardtack, resulting in rampant scurvy. As commander of the Military Department of the Missouri, General Winfield Scott Hancock countered disease with antiscorbutics—servings of onions and potatoes to accompany military biscuit.

During the American Civil War, machine-rolled “Mary land biscuits” arrived from Baltimore to camp supply in 60-pound (27-kilogram) boxes. Soldiers complained that factories boxed biscuit too soon, causing it to mold and fill with larvae. By soaking a wafer in coffee or soup, a consumer could skim off the insects and find no change in the liquid flavor. While families in the North consumed apple pie with morning coffee, Union soldiers in the field soaked in water or coffee the biscuit left over from the Mexican War. General Ulysses S. Grant became so outraged by the quality of biscuit stacked among cargo at City Point, Virginia, that he refused the shipment.

Upon receipt of ten wafers per man per day, soldiers stored biscuit in their haversacks to keep it dry and used it as sandwich bread to hold raw “sow belly” (salt pork) or as a basis for stewed apples. They fried the squares in lard or leftover pork fat into “skillygalee,” unimpressible by neglected teeth. Military cooks softened biscuit and stirred it into molasses and pork for a dish called “dandyfunk.” While infantrymen toasted hardtack over the fire on a forked stick, they cherished memories of their mothers’ cooking. Wealthier soldiers bought condensed milk or sugar to spread on biscuit.

Biscuit accompanied French social reformer François de la Rochefoucauld on his travels among the Canadian Iroquois in 1795, explorer John Lewis Burckhardt into Nubia in 1819, the Turks into Arabia in 1829, and General Charles Gordon’s men to the Siege of Khartoum, Sudan, in 1884. British beef burger, meat pasty, and sausage makers added biscuit to the meat mix to bind ingredients and hold moisture. During the Boer War, soldiers survived on rusk biscuits and coffee, which softened the crusts. In 1909, for the arduous trek to the Arctic Circle, Robert Peary carried only hardtack as bread to eat with condensed milk, pemmican, and tea.

In 1911, the U.S. military replaced hardtack with field bread. Industrialists augmented the basic recipe with the flavors of almonds, cinnamon, ginger,

lemon, mace, nutmeg, orange, and vanilla. Biscuit survives in Dutch rusks eaten with lightly fermented grape juice and German zwieback, a common teething biscuit fed to infants. In Edinburgh, Scots bakers perpetuate the recipe for Abernethy biscuit, a digestive aid recommended by vegans and vegetarians. In 1888, Dr. John Abernethy devised the wafer to contain sugar for energy and caraway seeds for metabolism.

See also: Crackers; Seaman's Diet and Cuisine.

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Blenders and Food Processors

The technology of emulsification and pureeing of wet ingredients increased the cook's control of mouthfeel, taste, and texture, particularly in recipes involving hard grains, seeds, ice, or frozen ingredients. Bar, home, and restaurant models of blenders made possible batters and purees for infant and invalid diets, emulsification of hummus and mayonnaise, smooth dips and gravies, and specialty drinks—daiquiris, frosted mocha mixes, fruit slushies, and yogurt smoothies. Handheld immersion blenders simplified the preparation of cream soups, pesto, and spreads and enabled preparers to concentrate on small areas needing intense coalescing, such as beet vinaigrette, Caesar salad dressing, and hazelnut butter.

The blender design of Polish-born inventor Stephen John Poplawski in 1922 in Racine, Wisconsin, outperformed the meat grinder and stand mixer. The inventor encased a spinning blade in an aluminum or glass carafe securely capped at the top and sealed with rubber gaskets at both openings. Blending was less dangerous to the hands than crinkle-cutting and dicing with a wire mandoline or shredding lime zest or potatoes for latkes with a box grater or microplane.

Milk Shakes and Health Foods

In 1933, one-switch control made possible the popular frappe or milk shake at confectionaries, dime stores, ice cream parlors, and pharmacies. Operation became the specialty of the soda fountain clerk, called a “soda jerk.” Decades of improvements to Hamilton Beach and Waring blenders enabled cooks to can and freeze foods prepared at variant speeds and to simplify the production of an ulcer diet.

Domestic equipment preceded the Dairy Queen soft-serve machine, an automatic large-batch blender that produced its first milk shake in 1940 in Joliet, Illinois. The company pioneered a faster emulsification of milk shake ingredients by using a creamier base for flavoring with chocolate, fruit, and vanilla syrups. The concept spawned Baskin-Robbins, Tastee Freez, and TCBY, which replaced ice cream with yogurt.

In Cleveland, Ohio, in 1949, W.G. Barnard introduced the Vitamix blender through the first televised infomercials aimed at caterers, coffee shops, cooking schools, hospitals, nightclubs, and restaurant chains. He demonstrated the use of a durable 3-horsepower motor to chop salsa and tapenade, grind coffee beans, juice root vegetables, and mix frozen desserts. Interchangeable agitators and pulse control extended the range of ingredients the Vitamix could flash blend, from delicate melon pulp for coulis and sorbet to tough cabbage leaves for chilled vegetable drinks and horse radish for hot dips.

The raw and health food movements of the late 1960s broadened interest in the swirling of peeled and unpeeled fruits and vegetables into broth, ice, milk, tea, and yogurt. At health food stores and milk bars, customers joined preparers in selection of nutritional supplements, including flax meal, gluten-free grains,

herbs, nori, *spirulina*, sprouts, and whey powder.

Food Processing

Extending the closed-canister concept of blending in convenience cookery, in 1960, French caterer Pierre Verdun broadened the food maceration chores accomplished by a fixed blade in his Robot-Coupe. In 1976, New York engineer Carl G. Sontheimer patented the Cuisinart, an adaptable food mill that outpaced the blender.

The introduction of separate blades in a wide bowl for chopping cucumbers, grating cheese, grinding allspice, kneading pasta dough, pureeing strawberries, shredding cabbage, and slicing potatoes revolutionized food preparation. The use of feed tubes enabled the preparer to merge additional ingredients while blending, such as carrots into cabbage slaw and eggs into cookie dough.

See also: Fads; Oils.

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[Blueberries](#)

From the exploration of North America by Europeans, newcomers from Alaska and Labrador to the Gulf Coast learned to value wild crops of blue-black berries

indigenous to the continent. Berry bushes spread from deer, bear, and bird droppings and flourished on thornless shrubs in the forest understory amid the humus along streams and wet leas. From 11,000 B.C.E., Paleo-Indians ate berries raw, dried or smoked them, and used them to season venison, in stew and *sautauthig* (cornmeal pudding), and as a dye and medicines. Blueberry juice soothed coughs; its dried roots produced a tea to relax the muscles during childbirth. Amerindians prized the tiny pome fruit as a sweetener in cooking and an additive to deer fat and venison in the making of pemmican. By the mid-1800s, the availability of cane sugar increased interest in the tart berries, which canners in Cherryfield, Maine, sold to Union provisioners during the Civil War.

Hybrid blueberries were one of the few fruits introduced to the commercial market in the nineteenth century. Quaker fruit specialist and hybridizer Elizabeth Coleman “Lizzie” White earned the moniker “Mother of Cultivated Blueberries” and “The Blueberry Queen” for introducing the wild highbush blueberry to North American commercial farmers as a money crop. Near a 3,000-acre (1,200-hectare) cranberry bog, she grew up at Whitesbog farm in New Lisbon, New Jersey, a farm pioneered by her grandfather, Colonel James A. Fenwick. She taught herself cultivation of what locals called “huckleberries” and French Canadians called “bluets,” a bush fruit indigenous to the acidic sand-peat loam of New England and north-central North America. After completing her schooling at the Friends Central School in Philadelphia, she studied at Drexel University.

On her own, White studied both swamp and upland berry bushes and handpicked the fruit in search of a money crop. She experimented with berry cultivation to produce no-waste fruit ready for picking in late June through mid-September and requiring no removal of seeds or hulls. Through self-education, she learned of the difficulty of domestic transplanting of wild root stock or growth from seed and of the importance of native blueberries to beekeeping and wild animal diets.

In addition to promoting bush cultivation by grafting and sucker propagation in low night temperatures, White sought cultivars producing fruit at least 3/4 inch (1.9 centimeters) in diameter for hand pollination to yield a berry 1 inch (2.5 centimeters) in diameter. She also researched means of protecting plants from katydid infestation. For the fruit industry, she issued a handbook on the culture of the cranberry (*Vaccinium oxycoccos*), a native fruit akin to the bilberry

(*Vaccinium ericaceae*) and blueberry (*Vaccinium corymbosum* or *Vaccinium australe*).

Creative Hybridizing

In 1911, White collaborated with botanist Frederick Vernon Coville, author of “Experiments in Blueberry Culture” (1911). Over the next 20 years at the test plantation in Burlington County, New Jersey, the two devised ways of growing and selling the intraspecific hybrids of native blueberry, a flavorful light-blue fruit featuring small seeds. From interviews with woodsmen and hunter-gatherers in New Jersey’s Pine Barrens, she identified qualities in variant strains in order to determine flavor ripening time, and sustainability.

Research and cash bounties of up to \$3 each for the largest berries in a 20-mile (32-kilometer) radius isolated the Rubel, a large, late-season cultivar suited to marketing that became White’s keystone of blueberry breeding. By cross-fertilization, she developed Tru-Blu-Berries, the continent’s first marketable blueberry. In 1916, she shipped the first 21 bushels of commercial fruit. For the propagation of the indigenous berry at Suningive, her 90-acre (36-hectare) bog nursery, and for promoting a complementary crop to cranberry growers, she became the first female farmer recognized by the New Jersey Department of Agriculture.

At her berry farm, White harvested 20,000 barrels of fruit annually from the Cabot, Katherine, and Pioneer strains, which sold well to hotels, restaurants, produce stores, and steamboat lines in Baltimore, Boston, and Philadelphia. She marketed rootstock in Connecticut, Michigan, New York, and North Carolina and introduced culture of the box or evergreen berry (*Vaccinium ovatum*) in northern California, Oregon, Washington State, and the Fraser Valley of British Columbia, the prime distributor of highbush berries. Her nursery pioneered the use of cellophane for packaging berries. In addition to being the first female member of the American Cranberry Association and, in 1927, the cofounder of the New Jersey Blueberry Cooperative Association, she published her findings in *Success* magazine and received honoraria from the horticultural societies of Massachusetts and Pennsylvania. By 1928, White had gathered 27,000 blueberry

seedlings suitable for cross-pollinating.

Wonder Berry

White's fostering of the native berry helped to spread commercial farming on land unsuited to grain and vegetable culture. The dryland or lowbush *Vaccinium pallidum* and *Vaccinium Rubel* thrived from West Virginia to Minnesota and Wisconsin as far north as Quebec. The highbush rabbiteye (*Vaccinium ashei*) grows on stock as high as 15 feet (4.57 meters) in Mississippi, Texas, the Carolinas, Georgia, and Florida as far south as the Gulf of Mexico and to Argentina, Chile, China, South Africa, and Uruguay. Leading the United States in blueberry exportation, Maine flourished as the lowbush grower of the cold-hardy *Vaccinium augustifolium* and Michigan as the highbush center, producing plants from 3 to 10 feet (0.9 meter to 3 meters) tall. Additional sources of berries include the drought-tolerant mountain berry (*Vaccinium membranaceum*) from New Brunswick, Norway, Nova Scotia, and Prince Edward Island.

In the 1930s, Germany and Holland entered the competition for marketing hybrid blueberries, which spread in popularity to Austria, France, Hungary, Italy, Mexico, Poland, and Turkey. Merchants sold them under the names *bluets* (Canada), *bolleber* (Denmark), Pemberton *bilberry* (Finland), *airelle*, *myrtille*, *myrtillier* (France), *bosbes* (Holland), *mirtillo néro* (Italy), and *blea-berry* (Scotland). By the 1970s, the introduction of imported U.S. stock to Australia and New Zealand initiated a vigorous competitor from the Southern Hemisphere for production of frozen and dried berries, blueberry juice and purée, and jam and jelly, cobblers and pies, ice cream and dairy drinks, wine, salads and compotes, and additions to breakfast cereal, scones, muffins, cheesecake, and pastry fillings.

The blueberry won the regard of nutritionists as a superfood for its antioxidant value and for its protection of the brain. As of 2005, the U.S. blueberry crop approached \$180 million in value. From the research of Amy Howell and Nicholi Vorsa at Rutgers University, publicity of the blueberry's value as an antioxidant and anti-inflammatory increased its value in Japan, Korea, and Taiwan in anticancer, anticholesterol, and antisenility diets. The fruit earned the nickname "brain berry," suggested by plant physiologist Mary Ann Lila Smith at the

University of Illinois. Uncooked berries also enhance the regimens recommended for depression, hepatitis C, and high blood pressure and hinder blood clotting in strokes and the onset of Alzheimer's disease, bladder infections, and macular degeneration.

See also: Canning; New World Commodities; Pemmican; Refrigeration.

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[Boré, Jean Étienne de \(1742-1820\)](#)

The founder of the Mississippi River delta sugar industry, Creole planter Jean Étienne de Boré de Mauléon revolutionized the dangerous job of boiling cane juice into crystallized sugar and broke the West Indian sugar monopoly.

Born to French nobility in Kaskaskia, Illinois, on December 27, 1742, he was the grandson of Robert de Boré, a postmaster and counselor to Louis XIV. From age four, Jean de Boré studied in Normandy and attended a military academy. At age 16, he entered the royal palace guard of Louis XV and advanced to captain of the Black Musketeers. Three years later in Paris, he married Marie Marguerite D'Estrehan des Tours, an heiress to land in the French colony of Louisiana.

In 1776, de Boré settled his family on a land grant in St. Charles Parish, a self-sustaining compound north of a loop of the Mississippi River. Risking his inheritance, he cultivated indigo and tobacco north of New Orleans, which was

then an unimpressive colonial outpost. The loss of his slaves to malaria and his fields to wind damage and chenille worm infestation forced him to introduce a new crop.

With the aid of Antoine Morin, an industrialist from Santo Domingo's sugar plantations, de Boré introduced a hardy sugarcane in 1794 with seed he purchased from Brazil. On reclaimed swampland, he invested \$4,000 in a drying shed and mill. He commanded his 40 male and female slaves with military precision. The following year, he introduced the *chaudron du sucre* (sugar kettle), a lidded reduction chamber that turned cane juice into granulated sugar and molasses. In 1796, his 100 hogsheads of cane sugar sold for 12.5 cents per pound (0.45 kilograms) and molasses for 12.5 cents per quart (0.95 liters), earning de Boré \$12,000. Louisianans proclaimed him a savior.

Within one year, local planters shifted from indigo to top quality sugar and introduced the nation's first agroindustrial complex. Over 450,000 acres (182,000 acres) of 23 state parishes, the total income produced a multimilliondollar industry. By 1801, Louisiana developed its prime location on a sea-lane and exported 500 tons (450 metric tons) of sugar per year. Applying science and technology, planters continued testing West Indian varieties of cane and methods of condensing its juice into sugar with bagasse (cane waste) as fuel. In 1802, de Boré achieved his largest crop, 40 tons (36 metric tons), which sold for 15 cents per pound.

In the final three weeks of French possession in 1803, Napoleon Bonaparte appointed de Boré as New Orleans's first mayor. A supporter of experimental crops and profit de Boré cofounded the Bank of Louisiana. Under U.S. administration, he accepted appointment to the municipal legislative council and helped lead the movement for Louisiana statehood, achieved in 1812.

By tripling its slave population, New Orleans quadrupled its export trade and dominated the European sugar market. The success doubled the South's crops by adding sugar to "King Cotton." The demand for field labor derived from rapid depletion of workers to snake and alligator bites and machete accidents. The misery of cane fieldwork inspired the slave plaint of "sold down the river," a sure sentence of death.

At age 70, de Boré joined the press for Louisiana statehood. At that time, over a radius of 14 miles (23 kilometers), some 70 plantations on both banks of the

Mississippi enriched the area with profits from 600 tons (540 metric tons) of sugar per year. Statehood brought a flood of slaves and American immigrants to work the cane fields and sugar refineries.

De Boré died on February 1, 1820, and was buried at Saint Louis Cemetery in New Orleans. His original sugar kettle remains on display at Louisiana State University in Baton Rouge.

See also: Creole Diet and Cuisine; Sugar and Sweeteners.

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Borlaug, Norman

See Hybridization

Bouillon

A nourishing French broth or stock, bouillon captures in a single pot the aroma of herbs, the flavors of mirepoix, and the meaty zest of anchovies, beef, ham, mutton, ox, poultry, or shellfish. Stock makers begin with knuckle and marrow

bones and boil the meat with fragrant allspice, bay leaf, garlic, onion, parsley, and thyme. According to Apicius, a Campanian food writer during the reign of the Emperor Tiberius, reducing broth, called *brodo* in Italian, required hours of slow simmering to marry flavors. A lighter recipe, called court bouillon (French for “short boil”), relies on minced herbs and vegetables in water or wine for a liquid in which to poach seafood.

Historically, bouillon referred to the herbed liquid in which cooks boiled or poached food. In Persia, the Sassanians of the third to the seventh century C.E. favored intense flavors, including ox meat simmered in beef bouillon. In the 800s, the Magyar horse men of Hungary returned from swift winter gallops through the Ural Mountains to sip warming bouillon.

A staple basis of bisques, cereal grain or legume soup, creamy vichyssoise, French onion soup, glazes, gravy and sauce, and Russian borscht, bouillon became a regular restorative for religious fasts and an offering of street vendors, who heated stock in bulge pots (rounded kettles) over charcoal braziers. Bouillon softened the hard bread of prisoners and soldiers and strengthened the flavor of dumplings, pasta, or rice with the richness of bone marrow. A vegetarian version featured almonds and other nuts, eggs, mushrooms, tomatoes, and root vegetables. Cooks dried the stock on flannel until it formed a gel or strained the liquid through a broth napkin or sieve to yield a nourishing beverage for infants, invalids, and patients recovering from abdominal surgery. Hosts could choose to separate solids from bouillon just before serving to clarify a consommé.

Western European food writing recounted cookery in 1375, when Taillevent cited the intricacies of preparing beef bouillon. With a basic stock, cooks coated capons and stirred up black pudding, and grillers soaked brochettes before heating. In *Le Cuisinier François (The French Cook, 1651)*, chef Pierre La Varenne systemized clear recipe ingredients and temperatures and codified methods of creating bouillon. His detailed instruction covered the bundling of herbs into a *bouquet garni* (garnished bouquet) for accentuating the aroma of reductions.

By the early eighteenth century, menus featured bouillon, either chilled or hot, accompanied by croutons as an introductory course to heavier entrées. In *The History of the Dividing Line Betwixt Virginia and North Carolina (1728)*, William Byrd, the founder of Richmond, Virginia, recommended an on-the-trail snack of dried bouillon for quick energy. In 1765 in Paris, vintner A. Boulanger opened a

bistro devoted to bouillon and *pot-au-feu* under the title *restaurant* (restoring), a dispenser of *restoratifs*. Refined buyers dipped soup from a tureen and ate their servings with long-handled soup spoons. The addition of chard to the stock tenderized leaves.

The industrial processing of dehydrated bouillon into a tiny cube, granules, or a lozenge offered convenience and transportability for the camper, home cook, and traveler. Filtration before drying ensured a product free of bacteria and mold. When rehydrated in sherry, vermouth, vinegar, water, or wine, the cube injected bouquet, heavy salt, and seasonings into beverages, casseroles, and chowders. Reduction of fluids resulted in a gel that dried rapidly in low humidity. Introduced in 1750s as defatted cake soup, meat extract, pocket soup, portable soup, quick soup, or veal blue, bouillon bolstered the pantries of ships' galleys and expeditionary tent kitchens with a shelf stable flavoring.

In 1756, English pharmacist William Cookworthy and his partner, a Mrs. Dubois of London, sold their thick soup-based cakes and paste to the Royal Navy as an alleged antidote to scurvy. Captain James Cook included bouillon in his supplies in 1768, when he commanded the HMS *Endeavour* on four expeditions to the Pacific. Subsequent stores of bouillon fed the crew of Meriwether Lewis and William Clark in 1804 on their exploration of the Missouri River and the Pacific Coast. In 1824, American idea man Peter Cooper developed the by-products of a New York abattoir into a domestic gelatin or portable soup for the convenience of house wives who had no time for the lengthy simmering of French-style bouillon.

Late-nineteenth-century culinary handbooks, such as Russian compiler Elena Burman Molokhovets's *A Gift to Young Housewives* (1861), detailed the lengthy processing of bouillon ingredients, beginning with the hand mincing of beef. In an 1863 recipe from French compiler Pierre Blot's *What to Eat and How to Cook It*, broth was the beginning of a pureed potage of mashed beans or peas. In Louisiana in 1880, a Bavarian immigrant, Madame Elizabeth Kettenring Dutrey Bégué, opened a coffee house in New Orleans's French Quarter and introduced brunch, a relaxed midmorning repast, with cups of court bouillon. By 1882, Swiss manufacturer Julius Maggi marketed inexpensive bouillon in cubes, the forerunner of instant soups and ramen packets.

See also: La Varenne, Pierre; Monosodium Glutamate; Russian Diet and Cuisine; Soups.

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Bread

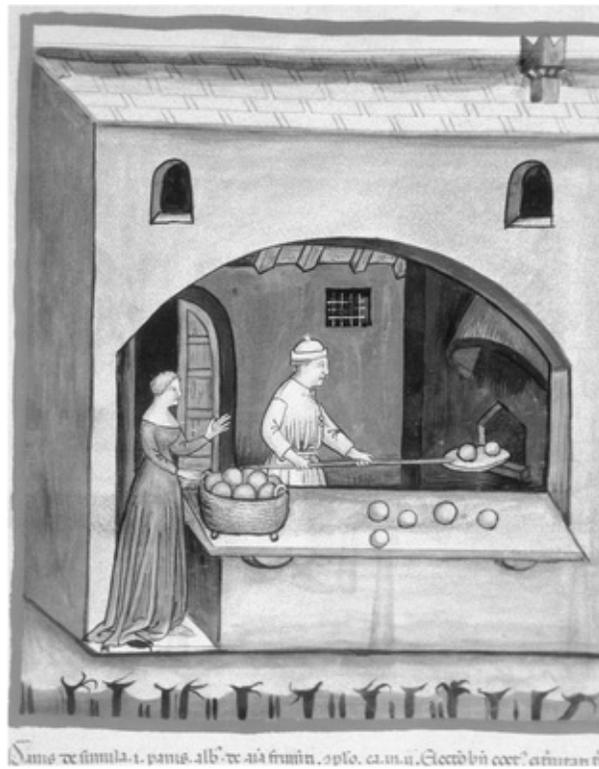
The ingenuity of bread makers contributes a vital chapter to global food history. Emmer wheat, first domesticated around 17,000 B.C.E., served preparers as a source of a dense, high-fiber bread, which they grated into soup as a thickener. Hand grain milling, the world's oldest food industry, refined the flavor and palatability of bread flour and meal. After 9000 B.C.E., the domestication of wild einkorn wheat in southeastern Turkey prefaced the spread of dough recipes and bread artistry to Israel, Cyprus, India, Greece, and Crete. Wheat grain formed a weak mass that nomads shaped around a spit and bakers dropped onto hot surfaces for a quick wafer to accompany meat and vegetables.

The inflating action of yeast on dough intensified during processing and baking, creating the first risen bread. Yeast thrived on wheat gluten and augmented the versatility of high-protein dough. Leavening puffed air pockets in dough that gave the browned crust an elastic texture and nutty taste. In Gaul and Iberia, the kneading of dough from foamy beer produced batches of light, springy bread, the forerunner of sourdough.

Egyptian bakers pioneered leavened bread and produced light, chewy loaves,

which the Greeks and Romans emulated. With the arrival of Alexander the Great to Alexandria in 332 B.C.E., emmer wheat gave place to durum wheat, a gluten-rich grain that baked into tight bread webbing. Greek cooks traditionally shaped dough into unleavened loaves that they baked in an oven and iced with honey. For elegant dinners, they fried wheat batter into drop biscuits or baked pancakes in crockery or under ash.

In Rome, the highest grade grain produced the whitest, tastiest rolls and loaves, the bread of the patrician class. After 27 B.C.E., bakers of the Roman Empire abandoned hard-hulled wheat for free-threshing bread wheat, the source of pie crusts and white loaves. With the spread of Christianity, bread for the Eucharist ritual took on a sacramental symbolism. Early medieval Italian bakers inscribed round loaves and buns with religious symbols. Around 1000 C.E., Scandinavian voyagers kneaded fibrous masses of barley, oats, and spelt into loaves for baking at the hearth or slathering on pottery shards for shardbread, the forerunner of shortbread.



An illuminated page from the *Tacuinum Sanitatis*, a fourteenth-century handbook on health and well-being, depicts a baker putting loaves of dough into an oven. A simple, inexpensive, highly adaptable food, leavened

wheat bread dates to around 3000 B.C.E. (*Alinari/Getty Images*)

Western Hemisphere

In the New World's agrarian culture, bakers valued the *duma*, a greased, convex soapstone or steatite slab, for cooking delicate, thin piki bread, a relative of the tortilla. The ash-blue corn batter rapidly conformed to the stone and baked into a crispy flatbread or corn chip. Piki anchored the diet with a carbohydrate finger food and utensil for scooping bites of salsa, mush, beans, and minced meat.

Until the introduction of metal cookware, Southwestern bakers made ponces and tortillas on round stones, which they heated at a fire pit. At the Acoma Pueblo west of Albuquerque, New Mexico, cooks shaped their thin *mut-tze-nee* bread over hot loaf-sized stones; during long journeys, Choctaw cooks made flat corn cakes on portable baking slabs. The Zuñi crisped corn cakes by rubbing the bake stone with oil and resin to refine and lubricate the surface. Food workers so respected their stone griddles that they reduced their voices to a whisper to keep the *dumas* from cracking.

Unlike the Zuñi and other North American and Mesoamerican tribes that baked bread in concave slabs, the Havasupai, who lived near the Grand Canyon, heated flat griddle stones in the fire, pulled them aside for cooking piki corn cakes, and then discarded the stones. Easy removal of the thin, curved bread required slicking the surface with pumpkin seed oil or suet. Handfuls of gruel sizzled on the surface and curled at the rim. The cook quickly pulled up edges and peeled the flexible corn wafer from the heat source before folding and rolling the bread into a convenient size and shape for holding juicy toppings.

Native American cooks also parboiled white corn grain in a covered vessel with slaked lime or wood ash as a preparation for bread making. The alkaline solution dissolved the grain's niacin bound in the endosperm by softening the outer shell and releasing a nutrient essential to well-being. Cherokee cooks made cornmeal into bean bread, a dough moistened with bean broth and augmented with sweet potato or squash pulp or nuts and seeds.

A pragmatic use of fire and rock, the hot stone method occurred in other cultures and under other names, for example, the Corsican *focolàre*, a baking

stone heated over a hardwood fire for shaping *mullade*, a large crepe to eat with fresh goat curd cheese and fruit or jam. Among the Andaman Islanders in the Indian Ocean, cooks used hot rocks to make chapatis, a round, unleavened flatbread favored on the Indian subcontinent for wrapping fillings. On the plains outside Dayr az Zahrani, Lebanon, Bedouin cooks, seated barefoot in small work spaces, heated traditional unleavened bread in thin cakes spread over a convex cooking surface. The shape required little fuel for turning flattened dough balls into floury bowls to contain other elements of the meal.

Middle Ages

In the 1300s, English bakers recycled ale barm as a leavening for bread and for an egg batter fried into “cryspeys,” a forerunner of the bagel, doughnut, fritter, funnel cake, and pretzel. During the late Middle Ages, the affluent bourgeois supped on manchet (soft wheat loaves), a slab that soaked up gravy and vegetable juices. At the end of a feast, hosts distributed the bread sops to the poor. For serfs, snacks of barley beer and oatcakes introduced the workers’ breakfast, which initiated consumption of a third daily meal. The baking of batter bread enabled Scots troopers to enjoy hot, fresh oat bread on their march into Northumberland, while English soldiers had to make do on cold, unpalatable biscuit prepared in advance and stored in ware houses for military use. Because bread evolved into the essential comfort food, the loss of a baker to accident or epidemic devastated villagers until a replacement trained for the job.

The availability and cost of bread in the Middle Ages presented the peasant with a constant struggle. In 1266, the Assize of Bread and Ale ended the feast-or-famine cycle by stabilizing prices based on the cost of wheat. Such sumptuary laws limited profiteering and allowed the wealthy to consume 3 pounds (1.4 kilograms) daily of *paindemayne* (hand bread), a springy white loaf limited to wheat flour. By the beginning of the Renaissance, the dukes of Saxony regulated the supply of bread to artisans for breakfast and the evening meal. On pilgrimages to holy sites, European travelers packed cheese wedges and flatbread for travel food.

Nineteenth Century to the Present

On the North American frontier, hearth-style pones served native Canadian trappers, berry pickers, and lumberers. European settlers of the plains centered cookery on ashcake, johnnycake (or journeycake), and mock oysters (corn fritters), all convenient pocket or saddlebag meals. For native bread, camp cooks blended dough from wild rice flour to flatten on preheated rocks balanced over an open fire. Into the 1900s, flat bannocks, a moist bread with crisp crust, came in such varied forms as raisin bread, scones, and cheese biscuits.

During the Industrial Revolution, commercial bakers evolved softer wheat bread and pastries graced with a less fibrous, more elastic crumb. Immigrants to North America marveled at the contrast between Old World bread recipes and the refined slices of sandwich bread bought from a store. House wives rummaged grocery stores in vain to find European types of flours for shaping of German-Jewish rye loaves and challah bread.

While the industrialized world flourished from better, cheaper, and more fuel-efficient bake ovens, rural Armenia doubled home heating as a form of bread making. One unusual dining arrangement involved the stoking of a *tonir* (pit oven), a ceramic cache similar to the tandoor oven of India, that held the coals at bottom with ashes spread on top. The stove chamber baked dough along the walls into *lavash* (bread) for eating with dried vegetables and raisins. While awaiting their meal, the family sat on top of the oven to keep warm.

After the processing of commercial yeast cakes in 1825, bakeries advanced the springy loaf with larger air cells. In Boston, the Parker House Hotel invented a yeast roll that commercial processors emulated. In 1912, Missouri inventor Otto Frederick Rohwedder standardized bread slices by inventing an automatic slicing machine. By the 1900s, grocery shelves displayed so wide a variety of dinner breads, sandwich buns, muffins, and holiday loaves that many homemakers abandoned the art of bread making. To American grain products, ethnic bakers added breakfast brioche and croissants, tortillas, naan, pitas, bagels, chapati, matzoh, and focaccia, an Italian yeast bread flavored with olive oil, tomatoes, and onions.

A mid-1970s health movement alerted diners to the absence of nutrition and fiber in carbohydrate-rich white bread made from over-milled, bleached flour.

The Real Bread Campaign urged advocates of a wholesome diet to seek wholemeal grain bread. Commercial bakers supplied variety in selections of ciabatta, rice cakes, seven-grain loaves, African sorghum loaves, Mexican corn bread, and sourdough loaves. Twenty-first-century bakers also devise artisanal products from ancient grains that answer the need for gluten-free breads and pastries.

See also: Biscuit; Einkorn Wheat; Emmer Wheat; Linnaeus, Carolus; Manioc; Milling; Seaman's Diet and Cuisine; Sourdough; Tortillas; Tudor Diet and Cuisine; Yeast.

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Breadfruit

A tender staple of Belize, the Caribbean, Oceania, and Southeast Asia, breadfruit (*Artocarpus altilis*) is an heirloom carbohydrate of the tropics. Trees fruit abundantly eight months of the year, usually in clumps of three. Whole breadfruit is highly perishable and requires storage in water. Unripe, it roasts within an hour in open fires and yields slices for pickling or eating raw.

Cultivated on the Moluccas and New Guinea around 2500 B.C.E., the heavy-fruited plant once fed elephants in the wilds of Southeast Asia. It traveled as root

cuttings over a 2,250-year span with Lapita voyagers to Melanesia, Fiji, Tonga, and Samoa. Grown up to 12 pounds (5.4 kilograms) on coral atolls and in well-drained soils, the pineapple-sized fruit was once the prize entrée of chiefs and royalty.

In prehistory, the tall shade tree provided leaves for food wrappers and bark, roots, and sap as treatments for dysentery and stomach upset. Cored and filled with codfish, crab, fruit, sugar, or taro, much like eggplant or rice, it absorbed the other flavors. During the off-season, the starchy pulp survived in leaf-lined caches as a fermented paste. The fibrous fruit, mixed with coconut and wrapped in banana leaves, baked into a loaf rich in vitamin C and potassium.

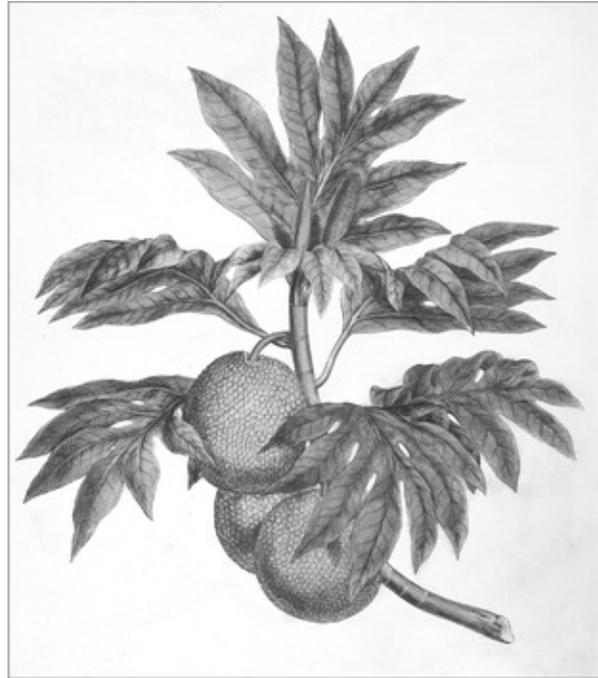
In 1595, Ferdinand de Quirós, a Portuguese fleet navigator on a voyage to Terra Australis, saw the breadfruit tree in the Solomon Islands and admired it for its efficiency and reliability. Islanders lengthened the shelf life of perishable harvests by fermenting them in pits and roasting or steaming them in *umus* (earth ovens). Balls of breadfruit paste saw natives through September and October, the stormy season.

Marquesan adventurers brought breadfruit tree stock to Hawaii. Preparers cooked breadfruit and sweet potatoes in a hot rock pit steamer. For ritual sea voyages by double-hulled canoe or outrigger back to Tahiti, mariners relied on “canoe foods,” including fermented breadfruit and dried coconut pulp. Europeans likened the taste to artichokes, egg yolks, fresh bread, and potatoes.

Breadfruit showed promise to arboriculturists for feeding world colonists. In the estimation of English sea raider and cartographer William Dampier, who described the fruit in *A New Voyage Round the World* (1699), baked breadfruit served the natives of Guam and Mindanao as bread. In 1750, the French East India Company favored Mauritius and Réunion as well as the Seychelles as naval refueling stations and victuallers. To ensure provisions, island agronomists planted test nurseries with 3,000 specimens of pepper vines, mountain rice, and *le fruit à pain*, both seeded and unseeded.

On Captain James Cook’s voyage to Tahiti aboard the *Endeavour* in 1769, he observed the offering of breadfruit as grave goods. Sir Joseph Banks, a naturalist on the voyage, and Swedish botanist Daniel Solander sampled breadfruit and found it to be a cheap source of energy food. Because of its prolific yield, they identified the fruit as a symbol of a pastoral utopia. The *Endeavour* crew

experimented with boiling and roasting breadfruit in the galley. When Cook published his journals and reported on his voyage to Tahiti to the Royal Society, lecturers pictured the breadfruit tree as a God-given blessing before the corruption of the Garden of Eden. French encyclopedist Denis Diderot extended the metaphor to a moral indictment. He charged European adventurers with introducing venereal disease among a virgin soil population.



The breadfruit, depicted here in the account of James Cook's voyage around the world in 1768–1771, is a common source of carbohydrates in the Pacific islands and other tropical areas. European botanists viewed the high-yield plant as a symbol of paradise. (*The Granger Collection, New York*)

After 1780, Banks, then president of the Royal Society, requested that George III import breadfruit trees to Jamaica to relieve cyclical famine. During consideration of the mission, in July 1787, André Thouin, head gardener of the Jardin des Plantes Médicinales in Paris, sought breadfruit saplings for transplant to French colonies. He distributed trees in Isle de France (present-day St. Bart's), Cayenne, Martinique, and St. Domingue as a vegetable ensuring human survival and providing fodder for livestock. Out of pride, Creoles rejected breadfruit as food intended for slaves. Greedy cane planters disdained the trees for taking up valuable space.

The British navy dispatched the HMS *Bounty* on December 23, 1787, to follow Captain Cook's route through the Society Islands to gather samples of the staple fruit for planting in the West Indies as slave food. The fateful mutiny on the *Bounty* delayed the venture but did not scuttle it. In February 1791, after an open-boat escape from mutineers 3,600 miles (5,800-kilometers) to Timor, Lieutenant William Bligh returned to the task as captain of the *Providence*. He succeeded in ferrying 2,126 Tahitian breadfruit plants in a specially designed shipboard green house to the Caymans, Jamaica, St. Helena, and St. Vincent.

A parallel interpretation of prolific breadfruit as a Christian symbol influenced the spread of Methodism. In 1795, the Reverend Thomas Haweis, cofounder of the London Missionary Society, used the allure of breadfruit to attract recruits to the Pacific mission field. In articles for the *Evangelical Magazine*, he claimed that God provided breadfruit trees to nourish missionaries while they evangelized islanders. Politicians used the conversion effort as a justification for British imperialism.

The plant spread to Australia, Colombia, the Florida Keys, Honduras, India, Madagascar, the Maldives, Mesoamerica, the Philippines, Southeast Asia, Sri Lanka, St. Lucia, and Venezuela. Currently, on Samoa, breadfruit is an essential product of agroforestry and a source of fruit for canning in brine. Chefs enliven breadfruit and taro recipes with brown sugar or curry, a luxury spice from India. On Vanuatu, breadfruit pulp sprinkled with coconut milk makes a filling breakfast. Malaysians peel and slice the fruit for frying in palm syrup. Hawaiians dice the pulp and cook it with bacon in milk as chowder.

[Recipe: Breadfruit Seafood Chowder](#)

In a soup kettle, fry two strips of bacon. In the fat, sauté 1/2 cup each of chopped carrots, celery, and shallots. Add 2 cups each of cream and shrimp and 1 cup of whole kernel corn. Cook the mixture on low heat for 10 minutes. Add 3 cups of chopped breadfruit and 1 cup of chopped parsley or taro leaves. Continue cooking for 10 minutes. Season with ground pepper and sea salt.

The tree yields more than pulp for fresh dishes. Puerto Ricans boil the flower spikes as a side dish or candy and sun-dry them. Costa Rican vendors sell the seeds to tourists. In Barbados, Fiji, Guam, Hawaii, and Trinidad, breadfruit comes to grocery stores as fresh fruit or chips. Canneries in Dominica and Trinidad ship breadfruit to London and New York.

See also: Cook, James; Lapérouse, Jean François Galaup; Polynesian Diet and Cuisine.

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Breakfast

Historically, the type and extent of food service that began the day revealed the availability of foods for a quick, filling break to the night's fast and the leisure to enjoy it. Persians began the day with a power drink, molasses stirred into clabbered milk, but no formal meal. Arabs paired yogurt with dates or olives; Moroccans melded honey with grilled wheat to make *zemata*, a sweet porridge washed down with mint tea. For Republican Rome, as far north as the Italian Alps, daily meals began with a light *ientaculum* (breakfast) of bread, cheese, dried fruit, and olives. Soldiers on the march relied on *pulmentus*, a porridge roughly stirred together from ground grains. Country folk favored chicken, goose, or quail eggs, which cooks collected fresh each morning.

The Middle Ages introduced more variety in morning breaks with perfunctory barley beer and oatcakes, but still no formal table service. Ironically, in Asia and Europe, the medieval working and farming classes departed for manual labor in the mornings on empty stomachs. A Chinese plowman depended on a midmorning repast of a crust of bread wrapped around an onion bulb or garlic clove.

In contrast to peasants, the first meal of the day for aristocrats fortified them for a relaxed lifestyle. In the fourteenth century, Ibn Battuta, an Islamic Moroccan traveler, performed no manual labor while visiting foreign dignitaries and advising them on government and ethics. Nonetheless, he relished a breakfast of *mash* (peas) and enjoyed chapatis (thin slabs of bread) fried in ghee with meat kebabs, minced meat with nuts and onions, and damson plums.

Morning Meals in History

By the Renaissance, the study of diet and stamina introduced changes in attitude toward the necessity of a morning meal. Oxford-trained physician Andrew Boorde wrote in 1542 in his *Fyrst Booke of the Introduction of Knowledge* that day laborers required three full meals to accommodate the demands of toil. Boorde proposed a corollary, that the privileged class risked health and longevity by overeating. “Brevite and shortnes of lyfe doth folowe,” he warned. Within the century, the morning menu in northwestern Europe began including boiled and poached eggs and bread with salt herring or curd cheese.

For African slaves in the Western Hemisphere, not much changed from medieval times to the seventeenth century. In the American colonies and the sugar islands of the West Indies, field hands cooked their own breakfast from leftover sweet potatoes or corn they grew in small kitchen gardens.

In contrast, a textured still life of a Spanish chocolate service painted by Antonio de Pereda y Salgado in 1652 establishes the atmosphere and mood of the pampered aristocrat. Closely arranged on a maroon cloth, a plate of pastries and cheeses alongside a lidded chocolate pot, a carved *molinillo* (swizzle stick), and pewter plate with cup, pitcher, and condiment jar connote a pleasant breakfast involving dipping pastries into the hot liquid.

The immigration patterns to North America throughout the eighteenth and nineteenth centuries exhibited the customs of varied motherlands transferred to the frontier in such breakfast fare as German *kuchen* and Jewish latkes (potato pancakes). In the early 1700s, reports of Swedish-American cuisine noted that breakfast consisted of pop robbin pudding, an egg batter boiled in milk. In Quebec, light crepes and heavier French toast vied for popularity. During winter 1777–1778, the Pennsylvania Dutch *schnitz* pie, made with dried apples, solaced the hungry Continental Army for breakfast at Valley Forge.

Peacetime brought together the media and the morning meal. In 1784, aphorist François de la Rochefoucauld commented on the connection between newspapers and breakfast. The perusal of an early-morning gazette accompanied the sipping of chocolate or coffee but impeded table talk. Unlike the dinners and banquets for which Georgian England and Regency France gained fame, breakfast was come-as-you-are casual. Diners could impale bread on toasting forks and hold them at the hearth to heat them enough to melt butter and absorb marmalade. At the Tuileries in Paris in 1799, even the Empress Joséphine enjoyed her morning meal as a social occasion by inviting female friends and their children for a pleasant meal devoid of imperial pomp.

The American Civil War era degraded the soldier's morning intake to fats and carbohydrates. For Johnny Reb, Confederate provisioners reduced breakfast to coush, a corn mush heated in a greased skillet. While families in the North consumed apple pie with morning coffee, Union soldiers in the field soaked hardtack in water or coffee and fried the squares in leftover meat grease. After wartime exigencies, in Trenton, New Jersey, John Taylor developed pork roll, a sausagelike pork product, in the late 1800s as a popular breakfast and sandwich meat throughout the Garden State.

On the western frontier, pragmatic house wives varied their corn-based meals with New England standards, johnnycake or corn pudding, a cooking style that emulated Amerindian cuisine. The term *hasty pudding* indicates the hurried stirring of molasses or maple syrup into corn mush for a quick morning repast, rounded out with cups of cider. Fireplace or campfire preparation for families on the move favored ashcakes wrapped in cabbage leaves and roasted in embers or hoecakes heated on a flat metal blade. Corn dodgers suited the horse man, including sheriffs' posses and salesmen, who stowed the compact edibles in sacks

suspended from the saddle horn. For cowboys and wranglers, a delayed breakfast followed the initial ranch or stagecoach chores with a substantial spread, which featured hashed meat with fried eggs and potatoes sautéed with onion and chilies.

The English Way

Emulating Queen Victoria and Prince Albert, the English during the Victorian era expressed the middle-class preference for family togetherness with a breakfast sideboard spread of grilled mushrooms and tomatoes, kippers and sausage or chops, meat pasties, Brie or Roquefort cheese, and muffins and toast with jam and butter. Tea took precedence over beer, which the gentry considered too coarse for the morning table. Establishing a precedent at Buckingham Palace on February 10, 1840, French club chef Alexis Soyer catered a breakfast for 2,000 following Queen Victoria's coronation. Kitchen staff kept plover egg entrées and rashers of bacon warm in chafing dishes along with artichokes, asparagus, and sturgeon.

For the gentry and Americans emulating the British aristocracy, a breakfast around nine or ten in the morning preceded an amble on the grounds or in urban neighborhoods, where strollers worked up an appetite for a more substantial lunch of multiple dishes. Late risers made do with a hot drink, usually chocolate, coffee, or tea.



The full English breakfast— eggs, sausage or bacon, mushrooms, beans, tomatoes, toast, tea, and jam— dates to the Victorian era and spread throughout the empire. “To eat well in England,” wrote Somerset Maugham, “you should have breakfast three times a day.” (*Rex Features/Associated Press*)

Following the flow of power, British morning menus permeated colonies around the world. The English morning food habits gave rise to elevenses, a midmorning snack, and to the bed-and-breakfast, a residential inn that provided travelers with a place to sleep and food before they set off for sightseeing or journeys. On Barbados, islanders customized colonial specialties with a native blend of broiled flying fish with a squeeze of lime juice. Bermudans clung to the British Isles with their imported Irish butter and scones. For the Welsh who could ill afford expensive breakfast foods, donkey tea, a stirring of burnt toast crumbs in boiling water, produced a warming drink with little else to recommend it.

As a result of the colonial heritage of Antigua, islanders began the day with a substantial breakfast. According to the semiautobiographical writings of Jamaica Kincaid, schoolchildren ate arrowroot or corn porridge and eggs along with buttered bread, cheese, and grapefruit. On holidays and Sunday mornings, cocoa accompanied a breakfast of *antroba* (eggplant), boiled eggs, bread, salt fish, and souse, a pickled loaf made from the head and feet of pigs. Kincaid denounced the colonizer’s insidious culture for insisting on English dishes rather than cheap, accessible island fruit, tree-ripened juices, and fresh seafood.

The Industrial Era

Factory-made breakfast foods ended the drudgery of early-morning preparation by replacing hot cereal with cold. In 1877, William Heston and Henry D. Seymour's Quaker Mill Company of Ravenna, Ohio, made cooked oats a staple of the American breakfast menu. Two Michigan brothers, John Harvey Kellogg and Will Keith Kellogg, introduced Americans to a wholesome, high-fiber breakfast food that required no cooking. In 1894, they manufactured ready-to-eat cereal flakes by baking thin layers of wheat paste. In 1906, the boom in breakfast cereals brought fame to the town of Battle Creek, from which the Kellogg brothers shipped 1,000 cases of bran, corn, and wheat flakes a day.

Charles William Post contributed Post Toasties, the beginning of a convenience food empire. In 1941, General Mills's introduction of Cheerios turned the staid oat cereal into a crisp doughnut, a shape that the Pennsylvania Dutch invented. Television ads of the early 1950s connected dry cereals with cartoon fun. Children identified breakfast cereals with Kellogg's Tony the Tiger or Trix Rabbit or Post's Sugar Bear. Worried mothers topped cereal confections with sliced bananas and berries, a concession to empty calories.

A&P, the Atlantic and Pacific Tea Company, prefaced an era of merchandise produced by company bakeries, factories, and meat packers, the beginnings of one-stop shopping. The company showcased its more successful product, Eight O'Clock Coffee, a light roast that became America's oldest name brand in 1859. The chain grocery added more house logos to its array, including Ann Page breakfast pastries.

Today, breakfast menus worldwide vary in detail but often focus on a single bread, fried cake, or cereal eaten with a hot drink of chocolate, tea, or coffee or with cold milk or yogurt. Grain gruel goes by many names, for example, Balinese porridge with coconut milk, Bangladeshi dal, Cambodian *babaw* (rice congee), Costa Rican rice with black beans and sour cream, English frumenty (spiced wheat in milk), Ghanaian porridge, Italian polenta, Malaysian wheat noodles, Nigerian corn *ogi*, Russian *kasha* (oatmeal), and Vietnamese *pho* (rice noodles). In China, a thin rice congee and *baozi* (steamed buns) accompany fillings of chopped pork and green vegetable or sweetened bean paste. For commuters on bicycles, a quick out-of-hand breakfast of a boiled poultry egg or fried pastries

from a sidewalk vendor suffice until there is time in mid morning for green tea.

Breakfast on Christian holidays bears ritual significance. On the fourth Sunday in Lent, English house wives around Bristol make mothering buns, an iced yeast bun topped with decorative candies and served with a hot beverage as a gesture of respect to mothers, the fount of renewal. In London on Good Friday, pastry cooks, such as the bakers of Old Chelsea Bun House in Jews' Row, advertise hot cross buns, a breakfast once endowed with curative powers. At Easter, the Polish baker aims for a delicate crumb in *baba*, a cake eaten after the sunrise Resurrection Service, when diners end the Lenten fast. Among Swedes, the kitchen work of children precedes a festal breakfast for adults served on December 13, St. Lucia Day, which preserves the virgin's martyrdom in 304 C.E. The oldest girl commands the kitchen and prepares a tray of coffee and *Lussekatter*, a furred sweet St. Lucia bun pocked with raisins, symbols of richness and innocence.

Americans select from wide choices of foods, from fried eggs and ham to pancakes and grits, a small-grained cereal the consistency of Tunisian couscous. Amish kitchen crews dole out ingredients in pinches and dabs rather than standard measures for such traditional foods as corn pie and sausage gravy, a breakfast staple thickened with spelt flour. The Creole influence in New Orleans infuses a sugary diet with more sweets at breakfast, including beignets sprinkled with powdered sugar and *calas*, fried rice cakes sold by black women on the streets. In South America, manioc becomes a common breakfast choice in the dough of *carimañolas* (filled fritters) served at breakfast buffets in Cartagena, Colombia.

By the 1970s, fast-food psychology among students, office workers, and drivers eroded the notion of the home breakfast table. The retailing of McDonald's Egg McMuffin and Burger King's Croisan'wich and French Toast Sticks with hot coffee created its own mystique enhanced by the electronic media. Schoolchildren made toaster meals from Pop-Tarts and frozen waffles. In 1975, the federal National School Lunch Program funded school breakfasts consisting of fresh fruit and toast or dry cereal with milk. The program subsidized free or reduced-priced morning meals to improve nutrition for the poor, especially parturient teens, and to establish a model of wise choices in breakfast menus for building strength and preventing tooth caries. Performance studies confirmed

that a substantial amount of the day's nutrients eaten at breakfast improves pupil concentration and data retention.

In 1979, a U.S. Department of Agriculture study embarrassed cereal makers with a chart of popular brands and the proportion of sugar. Leading the sweets marketers, Kellogg laced Sugar Smacks with 56 percent sugar, as contrasted to Quaker puffed rice, which contained 0.1 percent sucrose. The appeal to children was obvious in merry product names—Alpha Bits, Froot Loops, Lucky Charms, and Sugar Crisp, all more than one-third sugar. Although cereals bore the brunt of criticism, fruit-flavored drinks came in second in misleading the public about nutritional content.

A health backlash popularized breakfast cereals enriched with niacin, riboflavin, and thiamine and orange juice enhanced with vitamins C and D. In 1971, the Food and Drug Administration recommended the addition of iron to breakfast cereals and baby foods. Invalids bolstered their intake with Carnation Instant Breakfast and Ensure and with power bars, a packable snack for eating with mid morning coffee. Heartier breakfasts anchored eating to nutrition with fruit smoothies served with granola or muesli, a European favorite composed of dried apricots and raisins, oats, and walnuts.

Families indulged in special-occasion brunches, a sideboard buffet served in late morning by the leisure class, who enjoyed broiled grapefruit halves with a cherry on top or challah toast, while clutching tumblers of Bloody Mary stirred with celery stalks. Northern menus featured lox with bagels and cream cheese; Southern fare tended toward cheese or shrimp grits and pitchers of mimosas. Western breakfast showcased Hispanic influence in burritos and huevos rancheros.

See also: Cereal; Holiday Dishes and Festival Foods; Medieval Diet and Cuisine; Roman Diet and Cuisine, Ancient.

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[Brillat-Savarin, Jean Anthelme \(1755-1826\)](#)

Author and protosociologist Jean Anthelme Brillat-Savarin, a provincial epicure during the Napoleonic era, developed the culinary essay as a literary genre.

Born Jean Anthelme Brillat on April 1, 1755, southwest of Geneva on the Alpine border of Savoy at Belley, he received tutoring at the family estate and introduction at the court of Louis XV. He completed obligatory studies at Dijon's Collège de Belley and, like his male forebears, practiced law. Accustomed to a refined table, he rejected the beans, boiled beef and mutton, and potatoes of the peasantry in favor of a Lucullan roast or a casserole, a popular dish of the era.

Conscious of the privileges of birth and wealth, he evinced a personal philosophy based on social rank. At Versailles at age 34, he practiced oratory in defense of martial law and the executions that followed the French Revolution of 1789. Upon the death of his aunt, Pierette Savarin, he inherited her estate on the condition that he add "Savarin" to his surname.

Brillat-Savarin's rise to a more refined class enabled him to enjoy opulent dining and the camaraderie of fellow gastronomes. The author's table company turned foodways into an intellectual synesthesia, a merger of sensual delights of the eye, nose, and mouth. Like the classical Greeks, he extolled friendship as the height of human relations and declared it the obligation of a friend to grace a shared meal with the best of dishes.

In his amiable views on haute cuisine, Brillat-Savarin displayed the ambiguities and inconsistencies of his times. Reflecting on early imperial Rome, he fantasized joining the poet Horace for conversation and simple fare—roast kid and poultry with a good Burgundy and a dessert of figs, grapes, and walnuts. Still rooted in his childhood tastes, he embraced the passionate love of food and invited to the table fellow gourmands who could not afford a pantry of exotic ingredients and a knowledgeable chef.

The democratizing of the post-Regency era hailed fellow rationalists of any

class who preferred conviviality and table esthetics but abhorred gluttony and macho drinking bouts. As adjuncts to an appealing feast, Brillat-Savarin preferred elements of the ancien régime—a well-groomed staff and a sprinkling of fashionable female gourmands who contributed graceful manners and sparkle to conversation. At a time when the elite feared for their lives, he incurred republican approbation for past ties with the ruling class. From election to mayor of Belley, the author sank to outlaw and sought asylum in Switzerland from the Bonapartists. His wanderings took him to Holland and across New England and Philadelphia, where he earned a living teaching conversational French and playing violin in a theater orchestra.

In New York City, the author observed the delight of women eating ice cream from sidewalk vendors. Of Americans, he carped that they produced few national dishes but 32 religious sects. Among the U.S. foods he admired, Brillat-Savarin cited a recipe for oyster ketchup and praised the delicacy of American wild turkey. He rescinded his chauvinism in New Orleans, where Creole cuisine reminded him of the best of home. Of Louisiana's foods, he considered the blend of cocoa with sugar and

[Recipe: Creole Bouillabaisse](#)

Simmer 1 quart of fresh or canned tomatoes with the juice of one lemon, two chopped Vidalia onions, three fresh bay leaves, three chopped sprigs each of parsley and thyme, 1 teaspoon of ground allspice, 2 tablespoons of olive oil, and 1/2 cup of white wine. After the sauce thickens, add 2 pounds of tilapia fillets. Simmer with 3/4 cup of Italian bread crumbs and salt and pepper for 15 minutes. When the fish shreds in the sauce, top with a dozen small shrimps or littleneck clams. As soon as the shrimps turn pink or the clams open, remove the bouillabaisse from the heat and serve with French bread.

vanilla the “ne plus ultra” of offerings and a forgivable obsession of the gourmand.

The exile returned home in September 1796 to an unstable political climate. In

1800, he advanced to the French Supreme Court and lived at peace on his estate at Vieu, northeast of Lyon, where he enjoyed shooting and wine making. Most pleasing to his indulgent lifestyle were the variety and subtleties of cosmopolitan cookery, such as crème brûlée, which he shared with dyspeptic friends as a restorative. He promoted the competition among restaurant chefs and the influence of a hearty menu on sociability and democratization.

In 1817, Brillat-Savarin, then known as the King of Clubs, began writing an epicurean classic. At age 69, he issued the gourmet's bible, *Physiologie du Goût* (*The Physiology of Taste*, 1825), which imitated obsolete Greek dialogues and ornate French aphorisms to capture the complex stimuli of the table. Much loved and quoted, his work avoided dull food chemistry yet elevated gastronomy to a science. Among his opinions, he noted the importance of *osmazome*, the scientific term for the flavor of roasted meat.

Brillat-Savarin's text advocated sensible dining and imbibing according to the philosophy of Epicurus, a fourth-century B.C.E. Greek lover of pleasure. The author favored a meaty diet low in sugar, carbohydrates, and refined flour, three sources of obesity. He also avoided "bad sleepers" as intolerable companions. For insomniacs, he banned from the menu asparagus, celery, duck, hare, pigeon, roast meat, spices, truffles, and vanilla. Of game, he noted that pheasants and partridges must hang in fresh air to age to optimal flavor.

Brillat-Savarin's table delights ranged from bouillabaisse (fish stew) and eggs cooked in lamb gravy to truffled turkey with pâté and champagne, which he sipped sparingly. He relished coffee as a sharpener of the senses but warned parents against serving it to children. He recognized the physiological link between aroma and novel tastes and honored the French command of aromatic cookery as the height of civilization.

See also: French Diet and Cuisine; Restaurants.

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[British East India Company](#)

A joint-stock phenomenon for more than two and a half centuries (1600–1874), the British East India Company (BEIC) dominated international relations as well as world tastes in Asian foods and beverages. Established in London on December 31, 1600, the company issued £72,000 in stocks. The firm received a royal charter from Queen Elizabeth I to control English trade with central and eastern Asia.

Under the leadership of Admiral James (or John) Lancaster, skipper of the flagship *Red Dragon*, the BEIC launched its first voyage from Torbay in southwest England on February 13, 1601, with a companion fleet of the *Ascension*, *Guest*, *Hector*, and *Susan* and headed for the Malay Peninsula. At a Sumatran feast, Lancaster declared local rice wine to be as strong as aqua vitae, a distilled form of brandy. On his return trip from Java, Nicobar, and the Moluccas, scurvy killed 105 of his crew. Off the west coast of Africa, he harbored at St. Helena to purchase provisions of plantains and antiscorbutic lemons and oranges. Over the decade, reports of subsequent expeditions listed trade in local foodstuffs—alum for pickling and baking powder, areca nuts, black sugar (*jagra*), cardamom, China root (sarsaparilla), cinnamon, cloves, coconuts, ginger, pepper, rice, tamarinds, turmeric, and wax for sealing preserves.

The 3,000 investors in the BEIC dispatched up to 30 expeditions annually and reaped profits from £2 million in sales of coffee, cotton and silk, indigo, opium, sugar, and tea. Captains Lancaster and John Davis navigated treacherous waters to tap the pepper markets of the Malabar region of southern India and conducted private deals to supplement their salaries. To protect valuable cargoes from capture, on June 3, 1603, James I took financial and navigational risks to dominate the global pepper and spice trade. After the murder of Captain Davis by Japanese

pirates off Sumatra in 1604, the king initiated a war on privateering by ordering the seizure of the marauders' lands and cargoes.

The sweeping of corsairs from sea-lanes encouraged capitalism in the global food market and set the tone of Captain William Hawkins's trade at Surat in the Gujarat region of India, in 1608, when he bargained for cloth and pepper. On his way east from Africa, Hawkins made landfall at the Seychelles and replenished his ship's stores with birds, coconuts, fish, and turtles. His ship, the *Hector*, was the first English trader to approach the Indian shores.

The exposure of British sailors and dealers to Indian cuisine made a permanent change in the English diet by popularizing meat and poultry curries. It also introduced the practice of the chewing of betel nut to curb indigestion. By 1773, the Norris Street Coffee House at London's Haymarket had added curry to its menu.

Indian Trade and Indian Cuisines

James I esteemed the work of the BEIC and, in 1609, extended its charter indefinitely on the condition that the company not incur losses for a period of 36 months. In the early years, the monopoly competed with the vigorous Dutch East India Company and, to a lesser extent, with the Portuguese East India Company. By bribing the luxury-loving Mughal Emperor Nuruddin Salim Jahangir with British goods, Captain Thomas Roe in mid-September 1615 affirmed the British monopoly at Surat. At Bombay (Mumbai) on the Indian west coast, the Mughal emperor issued a *firman* (royal decree) exempting the British from trade duties on exports of cotton, indigo, saltpeter, silk, and tea. On August 22, 1639, Francis Day, administrator of the BEIC, bought land from Venkatapathy, ruler of Vandavasi, and built a fort at Madras (now

[Recipe: Curried Rice](#)

Heat 4 tablespoons of ghee (clarified butter) in a heavy skillet and stir-fry four green cardamom pods, half a cinnamon stick, four cloves, and 1/2 tablespoon of cumin. Add 3 tablespoons of chopped green chilies, one

minced garlic clove, and 1 tablespoon each of chopped ginger, coriander seeds, and rice vinegar, and 1 teaspoon each of tamarind paste and turmeric. Simmer for seven to ten minutes. Pour in 2 cups of basmati rice and stir for four minutes. Add 1 cup of cauliflower, green peas, sliced carrots, or bell pepper. Season with 2 tablespoons of sea salt and a sprinkle of ground pepper. Add 3 cups of water to the pilaf and steam for 20 minutes. Top with a scant handful of chopped basil, sliced almonds, or chickpeas.

known as Chennai), establishing a toehold, the seed of empire, on the Coromandel Coast of southeast India. By 1647, company factories (trading posts) extended from Surat, Madras, Bombay, and Calcutta (Kolkata) in the northeast to 23 locations on the Indian subcontinent.

Demands for exotic foods increased in the mid-1600s. Under the Puritan governance of Oliver Cromwell, in 1650, the English began drinking hot coffee at breakfast rather than beer. In 1657, Thomas Garraway touted tea to his coffee house customers as a health food effective against anemia, dropsy, and scurvy. Eight years later, the bubonic plague epidemic of 1665 boosted the value of nutmeg, which doctors declared a panacea against infection.

After years of poor management of the BEIC, Josiah Child, a naval chandler at Portsmouth, on the south coast of England, negotiated broader commercial rights with King Charles II, who renewed the company's charter. In 1668, the king granted the company a monopoly on activities in Bombay and allowed the BEIC to coin money, raise forces, negotiate truces, and hang violators of coffee and tea trade laws.

The Crown recognized the tea fad as a source of steady income. By 1684, tea drinkers were paying a tax rate of 5 shillings per pound on a shilling's worth of tea. To manage the hot drink, the English preferred handles on their Chinese porcelain teacups. At the shops of beverage vendors, called "penny universities" for the cover charge, aficionados drank tea while perusing newspapers and chatting with other customers. On August 24, 1690, chief BEIC agent Job Charnock purchased villages on the River Hooghly in West Bengal, India, and built a trading post at Calcutta. At Surat, John Ovington, the company chaplain, issued "An Essay upon the Nature and Qualities of Tea" (1699), a pamphlet advising tea fanciers on the purchase, storage, and enjoyment of the best

varieties.

By 1711, the BEIC had opened a factory at Canton in southern China and bought tea with British silver. Shippers, banned from the city, occupied the island of Hainan from June to December while loading cargo. During the process, the Chinese demanded custody of English guns and ammunition. Under supervision of the Chinese imperial port master, dock employees conducted business in pidgin English and kept account of British silver that paid the bill for tea, porcelain, and lacquerware. The Chinese ban on the opium trade in 1729 made no inroads against British merchandisers, who continued until 1839 to smuggle 1.3 tons (1.2 metric tons) annually of the contraband narcotic through Calcutta to China to exchange for tea. In shady offshore transactions involving opium and slaves, Indians introduced triangular trade by making cash sales of Chinese tea to the BEIC.

Tea and War

Following the separation of Bengal, Gujarat, Oudh (Awadh) in central Uttar Pradesh, and Sind in northwest India (now part of Pakistan) from the Mughal Empire in a 1748 rebellion in the Punjab, the BEIC moved inland from coastal shipping posts to acquire Bengal. Governor-General Robert Clive captured the area from the Nawab Siraj ud-Daulah and pillaged its wealth. By 1785, the BEIC controlled 281,412 square miles (728,857 square kilometers), home to 27 million Indians. Because of Clive's appointment of Indian puppet monarchs in select districts, the takeover extended up the Ganges River to Delhi and over the southern portion of the subcontinent. During a drought in 1770, the company's forced reallocation of Bengali farmland from grain and rice cultivation to opium poppies initiated a famine that killed some 10 million people, reducing the population of Bengal by one-third.

Advancing company authority turned the BEIC into a colonial power. The British Parliament's Tea Act of May 10, 1773, allowed these favored traders to ship Chinese tea to the American colonies duty-free, thus underselling colonial food marketers and contributing to the American Revolution. Historians surmise that the British attempted to exploit more of Asia to compensate their markets for

the loss of the American colonies. Under the leadership of Warren Hastings, India's first governor-general, extensive wars depleted BEIC profits. The India Act of 1784 established external control over the diplomatic and military elements of the BEIC, but the syndicate maintained control of the tea trade. Richard Wellesley, an Anglo-Irish colonial administrator, ousted the French from competition and turned the BEIC into an imperial power. The addition to company territory of Penang Island, west of the Malay peninsula, as a refueling stop on August 11, 1786, provided the region with protection from Siamese insurgents. In exchange, the BEIC acquired more stock for its food ware houses.

The colonial power of the BEIC reached unprecedented heights, providing the British economy with one-tenth of its annual revenues. A 1791 price list from merchants Morgan & Fenning of London divided tea, coffee, and chocolate beverages into four grades—good, fine, finest, and superfine. Green tea, which rose in popularity from 1610 to 1700, became the trade staple. Because 500 British coffee houses served tea, it accounted for 60 percent of the nation's imported goods. The Ranelagh and Vauxhall Gardens in London began serving tea to late-night dancers around 1730. Domestic service of tea demanded a strong infusion taken with milk and sugar, along with plates of spiced cookies and cakes. From 1713 to 1813, total imports of tea rose from 213,554 pounds (96,866 kilograms) to 31.9 million pounds (14.5 million kilograms).

The Tea Capital

With the acquisition of Ceylon (Sri Lanka) and its coffee, tea, and rubber plantations in 1798, Crown colonies ruled world food commerce. Tea alone transformed London, where it replaced ale as the favored beverage. BEIC trade employed a majority of the city's populace at company ware houses on Leadenhall Street or on the Blackwall Docks. On the north and south banks of the River Thames, company crews labored at building and repairing ships or blending, packing, and merchandising tea.

Anna Maria Stanhope, the duchess of Bedford, established afternoon tea at Belvoir Castle as a fashionable snack between lunch and dinner. To satisfy the tea-drinking public, Thomas Stamford Raffles bought the island of Singapore on

behalf of the BEIC from the Sultan Hussein Shah of Johor on February 6, 1819, and created a major global shipping port. In 1823, Scots merchant Robert Bruce discovered *Camellia sinensis assamica*, a tea variety grown in the Assam high country of India. His brother, Charles Alexander Bruce, introduced the variety to European tea drinkers in the 1830s. After the BEIC began marketing the light-leaved Assam tea in 1838, the malty taste eclipsed Chinese tea in popularity at London's India House. Charles Bruce immediately ordered the clear-cutting of Assam jungles to accommodate more plantations.

The formal separation of spice-trading competitors in Indonesia in 1824 awarded Ceylon, India, Malacca, North Borneo, and Singapore to the British, leaving the rest of Malaysia to the Dutch. The BEIC acquired part of Burma in 1826 and seized the port city of Aden from Yemen on January 19, 1839. During a struggle with Chinese Emperor Dao Guang over the opium trade, the BEIC annexed the island of Hong Kong in retaliation for the Cantonese port authority's confiscation of 20,000 chests of opium. Victories at the Chinese Fujian city of Amoy (present-day Xiamen) on the Taiwan Strait in 1841 and Ninpo (present-day Ningbo) in eastern China and a threat to Nanking (Nanjing) on the Yangtze River delta in 1842 at the end of the first Opium War led to expanded British trading privileges following the Treaty of Nanking.

Interlopers, led by Jardine Matheson & Company (JM & Co.), jockeyed for independent tea patronage, sending the first private shipments of tea to England in 1834. JM & Co. promoted the occupation of Hong Kong, and the declaration on June 26, 1843, of Hong Kong as a colony under the Treaty of Nanking established the company as a major trading force.

In Burma, Rangoon (Yangon) offered another Asian port in 1852. The purchase of American clipper ships sped global food distribution in half the time deep-draft merchantmen required. Scots botanist Robert Fortune increased the profitability of British tea plantations by stealing plants and seeds from remote Chinese provinces. Entrepreneurs introduced Chinese tea varieties in Assam, Ceylon, and Java, where press gangs cultivated and picked tea under a tyranny known as the "planter raj."

Following Assam's ascendancy as a center of tea cultivation, a revolt swept India, beginning with unrest in the spring of 1857 that exploded on May 10, 1857, into mutiny among the sepoy, Indian soldiers employed by the BEIC. The

conflict pitted BEIC troops against the British Raj. Because the company forced farmers to plant cash crops, families lacked subsistence crops to feed themselves and grew increasingly dependent on British colonists. At Bengal, Bombay, and Madras, some 257,000 sepoy (Indian mercenaries) remained loyal to the BEIC and rebelled against the Crown. The British put down the revolt and nationalized the BEIC; its Indian possessions, including its armed forces, were taken over by the Crown pursuant to the provisions of the Government of India Act 1858.

At its height, the BEIC commanded the planet's largest merchant navy and controlled half of world trade. After food entrepreneur John Daughlish, owner of the Aerated Bread Company chain of shops, introduced tea service at Islington in 1864, tea boutiques became a London fad. The light meal appealed to women, who visited with their friends over tea with scones and small sandwiches to socialize and enjoy the era's refined porcelain tableware. The BEIC disbanded in June 1874.

See also: Clipper Ships; Condiments; Curry; Dutch East India Company; French East India Company; Tea; Trading Vessels.

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Buffalo

A migratory wild ruminant that crossed the Beringia land bridge around 10,000

B.C.E., the American bison proliferated to 200 million, becoming the Earth's most populous megabeast. French trappers evolved the name *buffalo* for *Bos bison* from the French *boeuf* (cow or ox). Fed on savanna grass and prairie sedge, the bison reached heights of 6.5 feet (1.98 meters) and weights of 2,000 to 2,500 pounds (900 to 1150 kilograms). It traveled in herds as large as 10,000. Browsing at the rate of 10–20 acres (4–8 hectares) per animal per year, each lived up to 15 years along the largely treeless Great Bison Belt from central Mexico to the Arctic shore and as far east as the Appalachian foothills.

As early as 500 B.C.E. in Alberta, Montana, and Wyoming and south to Texas, buffalo herds ensured the survival on the Great Plains of 11 nomadic nations—the Sarsi in Canada; the Arapaho, Assiniboine, Blackfoot, Cheyenne, Crow, and Gros Ventre on the western plains; and the Comanche, Kiowa, Kiowa-Apache, and Teton Sioux along the Great Lakes and Mississippi River valley. North American natives drove the animals over cliffs called *pishkuns* (buffalo jumps). At the bottom, for weeks at a time, tribes ate prime parts—brains, eyes, gut fat, snout gristle, teats, testicles, and the birth sac and hooves of unborn calves. A calf's head required pit roasting.

Around 4000 B.C.E., stone mallets reduced muscle to meat flour for stuffing intestines to make pemmican, a preservation style that prevailed from Texas to Manitoba and Saskatchewan. Despite predation, wise Indian husbandry enabled the buffalo population to reach 59 million by 1500. Around 1541, Spanish explorer Francisco Vásquez de Coronado observed the Kansa and Cheyenne eating raw buffalo fat as their staple food.

Meat

Each nation created indigenous recipes. The Blackfoot valued liver; the Cree, buffalo blood; and the Kootenai, the heart. The Crow relished blood pudding, made with minced meat mixed into the liquid. Most used bile from the gall bladder as a sauce and drank the blood as a ritual gift from the gods for an abundant life. The Hidatsa boiled gallons of lung blood with marrow fat and dried onions and turnips. Stirring with a splayed chokecherry sapling added flavor. Each adult consumed as much as 15 pounds (7 kilograms) of unmarbled

meat a day.

Pursuers rack-dried enough jerky and softened enough hides with brain matter for provisions and trade. To disperse flies during meat processing, the women and children hung rawhide streamers to flap in the breeze. They prized the meat and milk of lactating cows and reserved buffalo bladders to hold marrow fat. When it was safe to light a fire, smoking reduced the weight of the tissue by some 83 percent and preserved it for up to 36 months. Cured fat, suspended from the smoke hole of a lodge, could be sliced and used like bread for jerky sandwiches.

Cooking required only elevating the paunch on a stick frame or tripod as a cauldron to stone boil the organs and viscera in a little liquid. After the roasting of leg bones in the fire, diners cracked them between stones to free the marrow. Children waited their turn for chunks of small intestines wrapped on skewers. With the ease of hunting buffalo came the luxury of fighting endless territorial skirmishes—Assiniboine with Sioux, Winnebago with Ojibwa. The arrival of the horse from the Spaniards around 1650 increased the range of tracking herds and the ease of returning meat by travois, a skin drag attached to a dog or horse by parallel poles.

Formation of the Hudson's Bay Company in 1670 earned profits for Native Americans as well as for its founders, interested chiefly in the fur trade. Great Lakes women taught white males the preservation of buffalo and moose by curing or smoking buffalo tongue and congealing pemmican, a native cache or pack supply and Canada's first processed food. The women flavored mashed camassia (prairie turnips) with berries as accompaniments to meat dinners. The 1716 winter count (picture calendar) of the Brule Sioux record keeper Battiste Good at Rosebud, South Dakota, depicted the stalking of herds as a communal way of life.



A small herd of American buffalo (bison) grazes on a ranch in Colorado. Once numbering 60 million, the bison is now raised primarily for human consumption. Sweeter and tenderer than beef, bison is also lower in fat and cholesterol and higher in nutrients. *(Michael Smith/Newsweek/Getty Images)*

On the Frontier

Introduction of Europeans to high-energy, low-fat meat enabled pioneers and soldiers to replace heavy stores of bread, porridge, and salt meat. Thus unencumbered, white expeditioners pushed farther north and west toward the Yukon goldfields and Russian Alaska. By 1749, natural interbreeding between bison and domestic cattle had produced the first beefalo.

Because of the spiritual nature of the buffalo, the Pawnee arranged skulls in geometric figures along the Platte River in Nebraska as a token of reverence for the source of their dietary staple. Simultaneous with the adoration of the huge beasts, plainsmen valued the herds as sources of chips and bones as fuel for cooking and heating. When settlers began grinding bones as fertilizer to enrich the soil, Indians unearthed skeletons around buffalo jumps to sell for sources of nitrates.

Indians and explorers followed herd trails in Indiana, Kentucky, Ohio, and Virginia, increasing losses among the 91 percent surviving drowning, falls,

lightning, and wildfire. For the white man, hunting brought easy money; for the Indian, it brought a sustaining cuisine. The introduction of 50 to 90 Sharps and Springfield buffalo rifle and bandoleers and the expertise of horse riders threatened the species as early as the 1830s. In an average year, the Hudson's Bay Company sold meat from 17,000 buffalo. The demand for buffalo tongue after 1826 rose from 1,923 every five years to a height of 25,657 in 1845.

Pioneers developed recipes for buffalo meat. Like the Indians, they began with hump meat, the most succulent cut. Cooks at Denver restaurants broiled and fried buffalo steaks, roasted ribs, and baked the nose. Stringier cuts suited stews and soups. Anticipating shifts in animal populations, Hudson's Bay Company officials at Fort Edmonton tried hybridizing more beefalo in 1844, a failed crossbreeding scheme involving penning up cattle with the more rambunctious buffalo.

Decimation

During an 18-year drought that ended in the 1860s, herds diminished, particularly in northern Mexico. On October 27, 1867, the Arapaho, Cheyenne, Comanche, and Kiowa signed the Treaty of Medicine Lodge, an idealistic accord with the U.S. government promising military protection of herds south of the Arkansas River. By 1868, tribes realized that they had to supplement their traditional meat-rich diet with small game and fish. The attrition coincided with the rise in demand for red meat to feed pioneers and railway crews. Hastening the animal's disappearance, fashion trends in the Atlantic states and in Europe favored hide rugs, robes, and belts and the display of horned skulls as trophies. New England restaurants featured buffalo tongue on their menus.

With the aid of federal marshals, crews of the Kansas Pacific and Santa Fe railroads laid lines along buffalo trails. By demanding that the great shaggy beasts be removed from tracks and telegraph lines to halt damage to engines and cars and delays to shipments, technological advancement disrupted migratory patterns thousands of years old. Around 1872, scouts and hunting teams north of the Arkansas River and around the Canadian, Cimarron, and Red rivers targeted herds and slew hundreds of animals per day. As the Santa Fe railroad tracks

reached Dodge City, Kansas, wagons delivered heaps of meat from hunting parties. Provisioners paid 3¢ per pound for prime cuts. The rest rotted where the animal fell.

The eradication of wild herds by railroad provisioners and thrill seekers firing from train windows hastened an end to nomadic Indian life on the Great Plains. Outraged at the waste, Cheyenne, Comanche, and Kiowa on Oklahoma reservations violated the accord by plundering ranches and trading posts on the Texas Panhandle. Because Plains Indians relied on the buffalo for food and shelter, President Ulysses S. Grant refused to sign a congressional bill in 1874 to shield herds from stalkers.

On grazing grounds between the Arkansas and Cimarron rivers and around Fort Dodge, Iowa, the buffalo died at the rate of 1 million annually. Beginning in the eastern and southern plains, the slaughter of the buffalo paralleled overt attempts to annihilate Native Americans. In 1875, General Philip Sheridan violated terms of the Medicine Lodge accord by urging federal authorities to slaughter herds to starve out Plains tribes and make them amenable to reservation life. The Buffalo Hunters' War brought malnourished Comanche warriors into confrontation with Texas hunters. In December 1876, Chief Black Horse directed a war party of 170 from the Fort Sill Reservation in Oklahoma to Texas and halted rampant herd slaughter outside Lubbock. By 1878, the buffalo were too sparse to warrant tracking. Western tribes used Winchester rifles to decimate the remaining herds.

Back from Extinction

By 1884, except on federal parkland at Yellowstone, the buffalo, numbering 1,200 to 2,000, seemed fated for extermination. The novelty of eating the sweetish meat increased its worth at markets. With the arrival of trainloads of gentleman explorers, rising prices heightened the vulnerability of the buffalo.

In 1888 outside Garden City, Kansas, preservationist Charles Jesse Jones crossbred buffalo and longhorns to produce the first "cattalo," a blizzard-tolerant species that he

Recipe: Beefalo Meat Loaf

Blend in a food processor two eggs, 1 1/2 cups of Italian bread crumbs, 1 cup of prepared mustard, and sea salt and pepper. Chop 1 1/2 cups of celery ribs and leaves and 1 cup of bacon. Mix ingredients into 2 pounds of ground beefalo meat. Form into a ball and flatten into a casserole and bake for an hour at 350 degrees Fahrenheit.

sold in Liverpool, England. In 1902, Jones tended a herd at Yellowstone National Park, where he worked as the first game warden. He returned to cattalo ranching at Grand Canyon, Arizona, in 1906 by breeding buffalo cows with domestic bulls. A similar conservation effort began in 1899 in South Dakota from the herding of 50 buffalo by Scots rancher James Philip along the Missouri River. While most modern-day buffalo retain some cattle genes, genetically pure stock still exists in Yellowstone National Park and in some private herds.

By 1931, *Popular Mechanics* magazine reported the bison population at 10,000. In the 1950s, revival of the buffalo reached a population of 350,000. In the early twenty-first century, the number stabilized at about 500,000. Commercial bison ranching is on the rise, with many producers promoting grass-fed, all-natural meat that is leaner and 40 percent higher in protein than beef. Currently, consumers eat some 20,000 buffalo per year, compared with the butchering of 45.6 million cattle.

See also: Amerindian Diet; Caching; Dried Food; Hudson's Bay Company; Pemmican.

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[Burbank, Luther \(1849-1926\)](#)

To bolster the world's food choices and to make luxury produce available at a low price, botanist Luther Burbank, the "plant wizard," hybridized 800 varieties of fruits, nuts, and vegetables.

Born on a farm outside Lancaster, Massachusetts, on March 7, 1849, Burbank dreamed of becoming a physician. He studied for only two semesters at Lancaster Academy, where he focused on painting and sketching, the basis of his skill at observation. A self-directed reading program led him to the essays of glaciologist Louis Agassiz and philosopher Ralph Waldo Emerson and to a mystical faith in biology's life force.

At age 16, Burbank worked at patterning and machining for the Ames Plow Company. At his father's death in 1870, he and his mother, Olive Burpee Ross Burbank, bought a small truck farm near Lunenburg. In addition to selling vegetables and seeds, he marketed a seedless white table grape. After careful crossbreeding from one seed ball, he developed 23 seeds into the Early Rose potato, an oblong russet, forerunner of the Idaho russet, America's most popular staple food. In 1874, he sold rights to his improved potato for \$150.

In 1875, before California became a horticultural paradise producing nearly one-third of the nation's food, Burbank moved to Petaluma to work for the W.H. Pepper nursery. He scouted chestnuts and wild yams and West Coast plums. At age 28, he bought 4 acres (1.6 hectares) north of San Francisco in Santa Rosa. Working as a carpenter, he supported his mother and his sister, Emma Louisa Burbank.

Using the work of Charles Darwin as a guide, Burbank became California's most innovative horticulturist. In his free time, he designed a green house in 1889 and opened a nursery, which he sowed with imported seed from India, Iran, and

Japan to raise 1,000 test plants. He grafted his “mother” trees with some 100 different varieties and raised experimental corn with 32 ears to a stalk. His practical trial-and-error system focused on consumer needs.

Burbank crossbred Patagonia squash and perfected Patagonia strawberries, a Chilean variety. He sold or burned all seedlings that failed to meet his standards for sturdy gene pools. With his empirical method of selection, he raised elephant garlic, low-acid tomatoes, and spineless prickly pear cacti, the latter valued as vegetable and fruit and as livestock feed for desert herders. Through persistent crossing of seven plum varieties, he produced the frost-resistant Alhambra plum. His fungus-resistant potato relieved the Irish of fear of future starvation.

Outside Sebastopol, Burbank expanded his botanic modification on the 18-acre (7-hectare) Gold Ridge Farm, where he managed 3,000 trials at a time. In June 1893, his cata log *New Creations in Fruits and Flowers* advertised the latest adaptations. His “Quality” wheat dominated plains fields into the mid-1900s. From 1905 to 1911, he obtained six \$10,000 grants from the Carnegie Institution to develop the elephant heart plum, paper shell walnuts, pineapple quince, and thornless Himalayan blackberry. His winter crimson rhubarb became a best seller in Cape Town, South Africa.

Degreed agronomists ridiculed Burbank’s plant mutations; ministers ranted from the pulpit that botanic experimentation was playing God. Yet the curious visited the test beds to assess his perceptive methods. European and South African farmers trusted his Elberta peach, Indian corn, quick-maturing chestnut, and dwarf sunflower.

For the American Breeders’ Association, he wrote articles on heredity and species formation and announced his cactus improvements in *Popular Mechanics*. The Luther Burbank Press published the 12-volume *Luther Burbank: His Methods and Discoveries and Their Practical Application* (1915) and the eight-volume *How Plants Are Trained to Work for Man* (1921). Fellow food originators applied Burbank’s theories of multigrafting and the crossing of species, such as the plumcot, a blend of the apricot and plum and ancestor of the pluot.

After weathering stomach and cardiac ailments, Burbank died on April 11, 1926. Four years later, Congress passed legislation to patent hybrids such as those propagated by Burbank. By 1945, California orchards fielded 2 million of Burbank’s hybrid plum trees and distributed fresh fruit and prunes worldwide.

His birth date, March 7, is marked each year in California as Arbor Day.

See also: Cacti; Ice Cream; Potatoes.

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Bushmeat

A common source of protein where forest dwellers and logging communities kill animals in the wild for food, *viande de brousse* (bushmeat) supplements the human diet with sustainable game as well as endangered species. Following meat-eating patterns that date to the first settlers of Australia, Aboriginal hunters roast emus, kangaroos, and pythons directly over fire or in earth ovens as their traditional cuisine. On Guam, the fruit bat and flying fox are delicacies; orangutans carry the same distinction throughout Indonesia, where people generally lack the taste for domesticated meats.

Where meat markets fail to sell fresh beef, fish, goat, or poultry at an affordable price, such as rural Equatorial Guinea and Ghana and among the 800,000 refugees from Burundi and Rwanda camping in Tanzania, buffalo and antelope serve poor families as a free-for-the-taking alternative. In some Bantu dialects, "animal," "meat," and "food" are the same word. An ethical quandary arises from the battle between conservationists and humanitarians, who refuse to put the survival of animals over that of humans.

Like the American turkey on Thanksgiving, bushmeat carries cultural significance for health and libido, especially during harvest festivals. In southern Sudan, giraffe and zebra rank high as kill among illegal hunters. The only investment is ammunition or snares, the trap of choice in Kenya and Uganda. From the wild, the meat passes to chop bars for butchering and sale, such as the open-air counters in Nigeria, which lack refrigeration and running water.

For some 30 million rural poor in the Congo River basin, 80 percent of family meat supply comes from wild game, including bushpig, cane rat, duiker, guinea fowl, manatee, Nile crocodile, pangolin, porcupine, and snake. In the absence of affordable protein, hunters resort to poaching on game reserves and national parks. To conceal illegal meat from patrols, families cook it after dark. Large-bodied and slow-reproducing animals, particularly elephants and monitor lizards, suffer the greatest threat of extinction.

Because of the high cost of delivering domestic meats in refrigerated railcars or trucks, bushmeat has become a major source of income in Amazonia, central Africa, and Sumatra. In eastern Ecuador in the 1960s, the Huaorani advanced from subsistence hunting to selling smoked agouti and peccary as a full-time business. In the eastern Cameroon, smoked gorilla brings high profits. On the Ivory Coast, sides of antelope and hippopotamus dominate menus at barbecues and parties.

Reliance on terrestrial game generates crises among apes and tortoises, both dwindling species. Further reducing meat sources, clear-cutting of forests and road building in Africa and South America force stalkers deeper into the wild for bats and giant rodents. Scientists predict that the precipitate extinction of vulnerable species eventually will cause human malnutrition and starvation.

Hunters smoke or sun-dry their kill and peddle rare species for cash to chic urban restaurants as far away as Brussels, Guangzhou (Canton), London, Montreal, Paris, and Washington, D.C. Upscale immigrant populations willingly pay exorbitant rates for the wild taste of home. To meet the demand for luxury food, dealers pack meat in luggage for smuggling through major airports.

Unsanitary conditions encourage the spread of salmonella, which thrives in both cold-and warm-blooded animals. The dressing and consumption of apes, bonobos, and chimpanzees spreads such blood-borne pathogens as the fruit bat-borne Marburg hemorrhagic fever, identified in 1967 in Marburg, Germany, and

the equine Hendra virus, first observed in 1994 in Brisbane, Australia. In 1976 in Zaire, the Ebola virus, a lethal zoonosis, passed from chimpanzees to humans, who died of hemorrhage and multiple organ failures. A more serious consideration of infected food is the evolution of the human immunodeficiency virus (HIV) from simian immunodeficiency virus (SIV), a related strain found in chimpanzees that reached pandemic proportions. Health officials fear that trafficking in illicit bushmeat may launch a new microbial threat to global populations.

The prophecy of epidemics spread by bushmeat continues to loom. In 1991, the bat-and pig-borne Nipah virus spread encephalitis in Malaysia and Singapore. Severe acute respiratory syndrome (SARS) emerged in Guangzhou, China, in 2003, apparently from the eating of civet cats. The list of connections to bushmeat extends to African squirrels, which carry monkey pox, and wild boars, which transmit trichinella, a parasite that survives in the raw meat of bears, foxes, raccoons, rats, and wolves.

See also: Australian Food Trade; Heritage Foods.

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[Byzantine Diet and Cuisine](#)

A merger of Greek and Roman foodways, the Byzantine diet and cuisine suited a

class-structured society. From the founding of Byzantium in 667 B.C.E. to the reflective gastronomy text *On the Observance of Foods*, composed by the imperial physician Anthimus in 500 C.E., cookery reflected the catch of fishermen. At a peak in imperial fortunes in 324 C.E., the Roman Emperor Constantine proclaimed Constantinopolis the alternate capital of his realm. Officials regulated food commerce and set prices on fish from some 1,600 trawlers per day.

By avoiding shortfalls and famine, the cosmopolitan city remained central to global history until 1453 C.E. Authorities solidified grain contracts with merchants in Alexandria (Egypt), Mosul (Iraq), and Trebizond (Turkey) and went to war with Bulgaria over honey supplies. Citizens tolerated both Christian and Muslim feasts and street fairs and sampled holiday recipes from both cultures. A cross-cultural favorite, Christmas gingerbread, furthered the cult of St. Nicholas.

For the lowest-class Byzantine, barley, emmer wheat, and legumes dominated the communal pot. Side dishes ranged from ash-cooked loaves and olives to thistles, bulgur wheat balls with yogurt, and herbed broth. From small garden patches, house holders harvested black-eyed peas and cabbage, eggplant, spinach, and zucchini, plus numerous root crops, including onions, radishes, and turnips. Bakers maintained privileged status for their contribution to urban meals of 80,000 loaves daily.

Travelers bought meat pasties and pies at taverns, baklava and soup from street vendors, and almonds, chickpeas, fresh fruit, pistachios, and walnuts at food stalls for pocket snacks. Inns featured fish stew on the menu. Innkeepers served citrus and pear preserves and frumenty, a grain porridge topped with carob seed, honey, and raisins. As sugar gained popularity, Byzantine chefs produced the first rose and violet sugar for sweetening aromatic beverages and candying citron and plums.

While soldiers made do on double-baked biscuits and cereal pottage washed down with *posca* (sour wine), creative cookery for the elite included cheese, doves, and partridges. Aristocrats chose among mackerel from the Black Sea, omelets, salad with oil and vinegar dressing, and shellfish as well as *garum* (fermented fish sauce). Around 20 C.E., the Roman geographer Strabo commented on tunny, a flavorful fish available off the Horn of Africa.

The windows of the imperial palace opened over the spice market to ensure air scented with artemisia, cubebs (Javanese pepper), and jasmine. For the table of

Emperor Justinian in the early sixth century, the Empress Theodora hired chefs from Greece, India, Persia, and Syria. Specialists planned the three courses, an appetizer followed by grilled sea bass and sturgeon or roasted suckling pig served with yeast bread and lettuce. The meal concluded with honey cakes and rice pudding for dessert.

Byzantine preferences for colorful, fragrant, and savory foods survive in eyewitness accounts. Blends of meat and vegetables wrapped in grape leaves anticipated dolmades, a Cypriot Greek dish. One baked entrée, stuffed squid, got its flavor from pomegranates mixed with rice. A tenth-century recipe for roast kid called for a garlic, leek, and onion stuffing and garum sauce. More affordable than gazelles, hares, and lamb, swine produced salt meat and sausage as well as ember-broiled haunches and lard for seasoning and frying fritters and pancakes.

At the nexus between Asia and Europe, Constantinople's markets traded in exotic goods from Arabia, Italy, and Persia and Cretan and Macedonian wine. Christianity increased business with vintners to supply the Eucharist. The flavoring of wine with absinthe, anise, chamomile, gentian, putchuk (thistle root), spignel (*Meum athamanticum*), spikenard rhizomes, storax (sweetgum resin), and valerian produced the forerunners of ouzo, retsina, and vermouth.

Spice markets stocked ambergris as well as anise, caraway, cinnamon, cumin, mastic, nutmeg, and pepper. Islamic merchants redirected rosemary and saffron from the druggist's shelf to the pantry. While the rest of Europe sank into the Dark Ages, the invention of marzipan, salted *bottarga* (mullet roe), the samovar (tea urn), and the table fork illustrates the innovations of the Byzantines.

Popular dietary handbooks introduced commoners to the balance of the four humors, an ancient scientific term for blood, phlegm, black bile, and yellow bile. To maintain nutritional harmony, authors paired *conditum* (wine concentrate) with spikenard and figs with salt.

In his treatise *On the Properties of Foods* (ca. 1075), Jewish nutritionist Symeon Seth, adviser to the Emperor Michael VII, illustrated period interest in eating. Seth encouraged meals of gazelle meat and asparagus and garlic and the choice of distilled water, juleps, and syrups for beverages. He suggested the serving of fresh fruit at the beginning of dinner but insisted that grapes be peeled and pitted. He was suspicious of cheese and millet and ruled out the eating of fish roe and very young pigs.

For religious ascetics, the *typika* (regulations) for monasteries placed severe limits on the consumption of cheese, eggs, fish, and meat. Rules grew more complex in the description of fasts, penance, and vigils. On Good Friday, monks and their guests ate equal portions of bread, raw greens, and water.

See also: Crusaders' Diet and Cuisine; Grilling; Maritime Trade Routes; Shellfish.

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C

Caching

From prehistory, caching—the hoarding of food, usually in a hidden place, for storage—has minimized the severity of food scarcities. A cache in a discrete site provided hunter-gatherers, nomads, mountain climbers, soldiers, and arctic explorers an underground store house or deep freeze for securing supplies. Copied from bear, coyote, magpie, rodent, squirrel, and wolf nest caching, this method of food, seed, and water preservation applies to holes in the ground, hollow logs, small caves, trees, and cavities in crags.

After the settlement of Mureybet and Abu Hureyra east of Aleppo in western Mesopotamia (Syria) circa 11,050 B.C.E., a millennium of drought forced the Natufians, the earliest settled people of Palestine, to adopt agrarianism by caching grain in storage pits as famine food. The ancient Chinese along the Yangtze River stored rice in pits, some of which survive to current times. North of the Aswan Dam in Egypt, the Wadi Kubbaniya inhabitants survived famine by caching smoked or sun-dried fish for up to five months.

Caching had its place in cultures beyond Eurasia. The Olmec and Tarahumara of north-central Mexico stockpiled dried corn on the cob, their staple food, in desert pits. In Queensland, Australia, Aborigines secured wild grain in hollow wooden bins or tied *bunya-bunya* (pine nuts) in skin bags coated in muddy straw. Grass-lined trenches served gatherers of cycad nuts, one of the world's most ancient foods, which they wrapped in tea tree bark. Tropical water lily roots and yams needed only drying and stacking at ground level. Africans of the southern deserts stored melon seeds and tamarind fruit for months at a time. As recently as 2002, during guerrilla warfare in Angola, women networked the transport and caching of edible supplies.

In the Americas, caching facilitated the spread of human subsistence to dry lands. From the first century C.E. in Arizona, the Hohokam laborers could gather and store as much as 175 pounds (80 kilograms) of dried mesquite pods a day, a

substantial guarantee of winter rations. In south-central Mexico, as the Nahuatl of Cholula, Puebla, became urbanized around 500 C.E., caching helped to stabilize food distribution. During seasonal abandonment of dwellings, caches remained safe from digging animals and obscured from the eyes of human trespassers.

North of the Mexican border, Mono farmers made slatted, clay-coated bins to hold acorns, filberts, hickory nuts, mesquite beans, and piñon nuts. The Zuñi concealed snow mounds in the mountains to ensure a stock of fresh water and spare hunters from carrying the weight of water bags. The Hopi developed water trails over long journeys. Women followed men and buried water-filled gourds before returning home. On the men's return route, they retrieved the water to save time and relieve thirst.

The acorn caches of Eastern tribes survived in the cold mud surrounding springs and remained edible for as much as three decades. By digging a decoy storage hole, successful food preservers fooled raiders into seizing small stores of less palatable food rather than search out the main cellars.

The Eskimo of Nunivak Island, in the Bering Sea off the coast of Alaska, packed woven grass bags or walrus hides with meat, blubber, and seal or whale oil. They weighted their underground stores with stones to keep out foxes. Along the Mackenzie River in Canada, the Kutchin cached food on stilted platforms. On the Fraser River in British Columbia, the Kootenai people speared salmon, smoked the filleted flesh, then packed it in cedar boxes to store in cache trees above the reach of bears and dogs. Notched poles served as ladders. On Baffin Island in 1578, according to English voyager Martin Frobisher, the Canadian Eskimo hid fish and meat under stone cairns, as a method of supplying Arctic males on their return trek from hunting grounds.

Along the frontier, pioneer farmers, hunters, and trappers emulated the Native American caches, thus saving supplies from arson and thievery. Settlers referred to the burial spots as "wells" or "Indian barns." Late in the 1700s, Canadian Indians derived the term "cache" from the French *cache*, to hide.

Methods of Food Cellaring

Caching evolved in different locales to suit the climate and address threats to

provisions, especially along routes favored by foragers or where territorial boundaries met, such as the Great Lakes hunting grounds contested by the Dakota and Ojibwa. Along Lake Superior and Lake Michigan, the Ottawa, Potawatomi, and Winnebago buried wild rice or secured it in cedar bark bags. California and Colorado Indians braided ears of corn and dried them on adobe roofs for stocking rock-lined larder hoards. To keep out rodents, families overlapped rock slabs and chinked gaps with stones.

Farmers of the Atlantic Seaboard and New England buried sacks of corn ears or parched kernels as well as “corn smut” fungus, which they preserved along with strings of dried pumpkin and squash slices and bags of beans and sunflower seeds to supply them during winter. To parch corn for mush, they heated sand and spread handfuls of kernels over it. When the kernels popped open, preparers sifted out the sand and reserved the exploded grains for pounding into meal or boiling with beans.

The Iroquois of Canada and New York extended the use of surplus corn by charring it and burying it in bark-roofed cellars along with cured venison in rawhide rolls or envelopes called *parfleches*. After digging several holes about 1 yard wide (.91 meters) and 2 yards (1.83 meters) deep and drying them with fires, a family secured animal bladders filled with nutritious marrow fat, skins of dried berries and jerky, and prairie turnips in buffalo or deer hide or cedar bark bags. Women stacked the provisions atop a lining of bark, bunchgrass, charcoal, corncobs, leaves, or willow twigs and strung the sides with braided roots, such as those of the camas plant, a favorite of the Nisqually of western Washington.

In the Northwest, coastal Indians saved bear fat in liquid form in a gourd or animal bladder and hid dried fish in trees in storage containers of split cedar. The Thompson Indians of British Columbia placed berries and roots in baskets wrapped in birch bark in cellars, which they covered with poles topped with dirt and pine needles. Additional brush pantry containers held acorns, the source of flour. For seeds and liquid, women wove rushes into storage jars and waterproofed them with piñon gum and tar before burying them. Columbia River tribes pulverized fish between stone clappers, added berries and herbs for flavor, and stored the powder in grass and rush baskets lined with salmon skin. The Hidatsa of Montana retrieved beans, corn, squashes, and buffalo fat from cellars to make pounded mush, which they served in wood bowls to scoop out with horn

or mussel shell spoons.

By choosing high ground or caching under shelving rock or inside a dwelling, Indians avoided water and rot in their granary pits and root cellars. In laying a fire pit over a cache, they concealed the true nature of the spot. A topping of ash, grass wall matting, gravel, leaves, sand, and a careful earth and sod cap sealed the cache from animals and thieves and waterproofed the store house.

In the Ohio Valley, the pits remained so secure that for years at a time families stored awls and flint knives, horn fishhooks and cooking implements, hammer stones, medicine bags, pottery, record sticks, ritual bones and adornments, and shell scrapers. In Ohio's Cahokia Mounds, archaeologists have recovered limestone smoking pipes and leaf tobacco and seeds buried in bowls and jars. After the preservers emptied a storage cache, they turned it into a midden by backfilling it with ash, hearth debris, worn moccasins, other refuse, and kitchen waste. When tribes attacked enemies, they deliberately set fire to the caches.

Historical Caches

At Patuxet, Massachusetts, on November 16, 1620, shortly after the arrival of the *Mayflower* at Plymouth Colony, Governor William Bradford rejoiced in the discovery of a mound of sand adjacent to a harvest cornfield. Inside, he dug out a basket containing three or four bushels of Narragansett corn, a staple that the aborigines of southern New England had grown since 700 B.C.E. Reconnoitering two Indian houses, the English also commandeered beans and more corn. A year later, the Pilgrim settlers learned that the Wampanoag bore a grudge against food pilferage, which tribes ranked as a serious crime. Nonetheless, the Indians shared provisions with the English to assist them through a difficult winter. In spring 1621, Squanto joined Chief Massasoit in training the Pilgrims in growing and storing corn. To the south, in Jamestown, Virginia, however, the Powhatan War of March 22, 1622, resulted from the intent of indigenous people to punish English settlers for stealing pantry stores.

On the Great Plains, natives of the upper Missouri River valley scraped holes with an adze shaped from a buffalo scapula, then organized food in buffalo hide tarps. During the Lewis and Clark Expedition, in winter 1804-1805, explorers at

Fort Mandan (present-day Washburn, North Dakota) found that Mandan women packed squash, the most perishable vegetable, in a store of shelled corn kernels. Corn ears pointed inward, leaving the dry stems, the least likely to rot from dampness, pointed outward. Both navigator Pierre Cruzatte and organizer Meriwether Lewis learned cache design for use later on their route over the Rocky Mountains.

In the 1830s, artist George Catlin observed food caching among tribes along the Missouri River. He described their drying of corn on the cob for caching with dried meat and pemmican, topped with bear grass. The jar-shaped deposits ranged from 2 yards (1.8 meters) at the bottom to a mouth less than 2 feet (0.6 meters) wide. After shoring up the sides with sticks and moss and blocking out seepage with skin linings, families concealed their caches from detection by sealing them with dirt and sod.

Farther south, Plains tribes' caches were deep enough to require a ladder to reach the bottom. After a buffalo kill, women filled and buried skin bags with leftover fat to be used in cooking.

See also: Arctic Diet and Cuisine; Beans and Legumes; Díaz, Bernal; Einkorn Wheat; Ice; Nuts and Seeds; Pemmican; Storage, Food.

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[Cacti](#)

A ubiquitous species in hot, dry environments, the cactus provides desert and mountain dwellers with sources of candle material, food dye, fruit, flesh, and fluid. Cactus flourished in Central and South America and the Galapagos Islands, where it became a curiosity to European explorers. Spread across the Western Hemisphere around 100,000 B.C.E., the plant was a staple of the Nazca of Peru and among the Maya in Tlaxcala, Mexico, according to Spanish observers in 1519. The Zuñi made similar use of the tree cholla in ritual. The Huichol of west-central Mexico gathered the *tsuwiri* cactus to celebrate the harvest. The Acoma, Keres, and Laguna kept cactus as a fallback in starvation times.

In 1769, Franciscan missionaries introduced cacti from San Diego, California, south into Baja California. They harvested the “mission cactus” as a source of fruit and of mucilage for binding adobe brick. The Seri of northwestern Mexico used long poles for gathering the *Stenocereus gummosus* for fresh fruit and *cardón* seeds, which they ground into flour or pounded into mush. Peruvians made cactus into *cimora*, a psychotropic drink; the Tarahumara of central Mexico turned the sunami cactus into a sacred intoxicant. Farther north, the Blackfoot ate cactus fruit to treat enteritis and made the seeds into eye treatments.

After Christopher Columbus introduced the Caribbe an *Melocactus*, or melon cactus, to Spain and described its use as a vegetable, the plant found its way east in ships and on land caravans. Travelers have relocated cacti to Corfu, Cyprus, Egypt, Eritrea, Ethiopia, Greece, India, Israel, Jordan, Libya, Malta, North and South Africa, and Southeast Asia and west to Hawaii and the South Pacific. In Sicily, slices from cactus stems served as plates. In Australia, the explosive growth of the prickly pear after its introduction in 1788 ruined 60 million acres (24 million hectares) of New South Wales and Queensland for other crops and forage.

Cooking methods varied by culture. Bolivian Indians harvested spherical cacti for boiling like potatoes for holy feast days. The Gosiute and Keres roasted cactus pads in damp sand and served with chili. In spring, the Papago sliced and boiled green buds and shoots like green beans or stewed them with onions and peppers. Dried cactus blossoms became pantry staples for the Cahuilla and Maricopa for dipping in syrup. The Indians of Zacatecas, Mexico, harvested cactus buds for frying and serving with chilies and eggs. In the Sonoran Desert, the Tohono O’odham baked cholla buds overnight in a fire pit to produce a storable food for

boiling into gruel for the sick.

While traveling in the wild, desert Indians sliced the stem of the barrel cactus and crushed the tissue to allow liquid to collect. When cooked in honeyed water, the spongy pulp became a refreshing dessert. Travelers cut cores of the saguaro and chewed the cortex for moisture.

As a food, the cactus produces tasty berries and fruit, such as the red ovules with white pulp on the night-blooming cereus of Yucatán and the jelly congealed from the common saguaro fruit. Another species, the *garambullo* (*Myrtillocactus geometrizans*), rewarded the ancient Hohokam and the Apache, Papago, Pima, Sinagua, and Tewa with a currant-sized berry that they ate fresh or dried like raisins for mixing with *pinole*; the Diegueño of southern California dispatched their children to sell the dried fruit.

The Tequesta of southeastern Florida harvested the purplish-red fruit of the prickly pear (*Opuntia stricta*), also known as tuna or the Indian fig, and rolled it in sand to remove spines. The Havasupai and Navajo valued the tulip prickly pear for its pulp, which they made into a beverage. By crushing the fruit of columnar cacti, Indians extracted the juice, placing it in ollas (large earthenware jars) to ferment into vinegar or wine for drinking at rainmaking ceremonies. Harvesters found uses for leftover seeds in candy and porridge.

In 1912, California horticulturist Luther Burbank hybridized a spineless prickly pear as forage for cattle, hogs, and sheep. Currently, preparers hold the fruit in a gas flame to ready the pulp for preparing as candy, cheese, ice cream and sorbet, jam, lemonade, liqueur, margaritas, salad dressing, or syrup.

Mexico produces approximately 200,000 tons (180,000 metric tons) of cactus annually, two-thirds of the world's domestic crop. Mexican cuisine reprocesses the *Opuntia nopa* paddles pickled or deep fried with chili and cumin and as additions to egg casseroles, grilled vegetables, salads and salsa, and tortillas as well as the basis of an

[Recipe: Desert Blush Lemonade](#)

Score the peels of six lemons with a fork or zester. Slice and steep in 6 cups of boiling water. Add 1/2 cup of sugar and dissolve before stirring in 1/4

cup of prickly pear juice and four crushed lemon mint leaves. Serve over cracked ice.

alcoholic drink called *colonche*. Mixed with cow brains, *nopales* (cactus stems) produce a nutritious taco filling at roadside stands. As a healing plant, cactus aids in the dietary control of cholesterol and diabetes. Farmers also plant rows of cactus as a boundary fence to keep livestock out of food crops.

See also: Amerindian Diet; Peyote; Pit Cookery; Prohibition; Tex-Mex Diet and Cuisine; Vinegar.

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[Cajun Diet and Cuisine](#)

A southwestern Louisiana table tradition created by Acadians from New Brunswick and Nova Scotia, Cajun food combines seafood and wild game with local herbs and rice to yield a slow-cooked, zesty Southern fare. The corruption of the term "Acadian" into "Cajun" occurred from 1755 to 1788, when French colonists fled British rule. After the harrowing voyage down the Atlantic Coast to the Gulf of Mexico, they sustained themselves in the bayous west of the Mississippi River delta and lived free to speak French and practice Catholicism

without restraint. A vigorous culture that once coexisted with the Micmac of Canada, Cajun lifestyle gravitated toward fellowship with other delta dwellers—African, Amerindian, coastal Mexicans, French, Iberian, and Italian.

The original Cajun hunter-gatherers and trappers lived in poverty and cooked what ever lay at hand. Unlike the high-toned Creoles, with their classic herbs, cream, beef and venison, and wheat bread, backcountry Cajuns depended on the beans, corn, greens, and peppers from their gardens and chicken and turkey eggs from the coop for custard pies. Extra eggs sold at the market bought shoes for churchgoing and *bals de maison* (house dances). From the Caddo and Choctaw, Cajun cuisine focused on alligator and turtle, birds and squirrels, pecans, and ground sassafras leaves for *filé* powder, as a thickening agent in soups and stews. From the wilds came blackberries, peaches, and plums for double-crustured pies and sorbet. Local waters teemed with blue crabs for stuffing oysters for gratins, shrimp for spicy lemongrass soup, and soft-shell crabs for breading and frying.

Living on tracts from 4 to 12 acres (1.6 to 4.9 hectares) and hunting as far inland as the central Atchafalaya River basin, fiercely self-sufficient Cajuns sufficed on soul food. Using recipes from the mother country, they salted duck for duck confit and cooked sorghum into molasses, a standard table dip. Cooking style tended toward grilling, marinating, and smoking crawfish, shrimp, and tasso (pork shoulder). From Plaquemines Parish, where sailors discarded citrus fruit seeds, groves of blood oranges, grapefruits, kumquats, lemons, and satsumas yielded the juicy sections for ambrosia, a bright fruit extravaganza sweetened with coconut and sugarcane juice and decorated with fresh mint sprigs.

Communal events favored crab and crawfish boil-downs and bouillabaisse as elements of a *bon temps* (good time). At a *Grande Boucherie des Cajuns* (Cajun pig slaughter) preceding Lent, cooks stuffed fresh *boudin* and the coarser *andouille* sausages. Women labored in teams to extract lard and tripe, cure pork belly in sea salt, and shape *platines* (pork patties) and souse, or head cheese, a cold cut congealed from pickled foot or head meat in meat jelly. Children anticipated *gratons*, the crackling pork skin that they crunched for the intense meat flavor.

Less refined than Creole chefs, Cajun cooks blackened chicken and bony “trash fish”—bream, croaker, drum, gar, and gaspergou—and slow-cooked them in broth in iron pots. Alongside cayenne, okra, onions, and mirlitons (chayotes), rice, the

predominant meal stretcher and thickener, dominated *boudin noir* (black sausage) making and dirty rice, a mix of long grains with chopped organ meats. Like Creole recipes, Cajun entrées began with roux, a fried flour base for jambalaya and gumbo, a meaty puree served over rice or in broth seasoned with crawfish and shrimp heads. *Poutine*, a roux topping, consists of a thick savory gravy served with stewed beef over rice.

A standard flavoring in Cajun cooking, Tabasco pepper (*Capsicum frutescens*), a local specialty from Avery Island in Iberia Parish, came to market in 1869 from the factory of financier and confederate army paymaster Edmund McIlhenny. He crocked salt from the Avery salt dome with Central American red peppers for one month before adding white wine vinegar and aging the slurry for another month. Before bottling and corking the mix, he strained it to remove skins and seeds. Within a decade, his Tabasco sauce flavored dishes from Virginia City, Nevada, to England and Guam and accompanied the British army to the invasion of Khartoum in the Sudan. In the 1920s, the Cajun pepper sauce accentuated the Bloody Mary, a blend of tomato juice with vodka. Later purchases placed Tabasco in army MREs (Meals, Ready-to-Eat) and on space shuttle flights.

After Hurricane Katrina devastated the Mississippi River delta coastline and farms in August 2005, chefs John Besh and John Folse joined other food specialists in restoring Louisiana's economic basis. They provided 26,000 meals daily in St. Tammany Parish and distributed organic seed to farmers of herb and vegetable varieties necessary to Cajun recipes. Industrialists restored hand

[Recipe: Maque Choux](#)

Chop and stir-fry one each of celery stalk, green bell pepper, onion, and tomato. Crumble and brown 1 pound of *andouille* sausage. Add together the stir-fried vegetables, the meat, and the milk and pulp sliced and scraped from a dozen ears of corn. Simmer at low heat for 30 minutes. Stir in 1/2 cup of light-brown roux, made of a blend of 4 tablespoons each of bacon fat and flour. Season with black pepper and cayenne and 1 teaspoon of sea salt. Serve with a sprinkling of chopped scallions.

crafted butters and sauces to the marketplace. A local program ensured that raisers of Berkshire hogs and white-faced cattle would find buyers close to home.

After hurricanes Gustav and Ike in late August–early September 2008, restaurateurs once more opened field kitchens and fed smallholders who were too poor to flee disaster. The familiar taste of spinach madeleine, green tomato pie, Canary Islands *caldo*, fig salad, crawfish corn bread dressing, and sweet potatoes in cane syrup restored the faith of Cajuns and others in the stewardship of the land and its food.

See also: Creole Diet and Cuisine; Grilling; North American Diet and Cuisine; Smoked Food.

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Cannibalism

The ingestion of human flesh by humankind, anthropophagy, or cannibalism, is rare in the civilized world. In Paleolithic times, before ethical governments and priestly consortia outlawed the practice, however, consumers equated human bodies with other sources of nutrition. Eaters of human flesh applied the same practices they used on beasts—digging up and eating raw decomposing viscera and putrefying liquids, singeing and scraping, open-flame toasting, pit baking, wrapping in banana leaves for steaming whole, stuffing, skinning and disjoints,

slicing and marinating, and boiling in ceramic pots.

Gnawing and flensing (de-fleshing) knife marks on human bones attest to the practice around 50,000 B.C.E. in Switzerland and after 13,000 B.C.E. at Gough's Cave in Somerset, England, perhaps as a means of discouraging raiders on hunter-gatherer clans. The practice warded off famine among Bohemians in 2000 B.C.E. and, after 1200 B.C.E., among the Anasazi of the Four Corners area of the Great Basin. Additional remnants of humans feasting on human meat marked Ethiopian foodways and Scythian funerals before 450 B.C.E., the Numantine War against the Roman Republic in north-central Spain in 134 B.C.E., the Muslim wars of 625 C.E., and the First Crusade (1096–1099). A unique form of bone eating in Egypt involved the grinding of mummies into medicine, a practice that continued until the late 1500s.

The New World astounded its conquerors with evidence of flesh eating. The Iroquois, for example, tortured and beheaded prisoners of war before spit-roasting them. The barbecuing of limbs and organs on a green wood grill marked the feasting of the West Indian Arawak and Carib, whom Christopher Columbus observed in December 1492. When the Spanish learned about a four-day Aztec cannibal festival that occurred in 1486, they recoiled from the assault on European aesthetics and coined the term *cannibal* to indicate a revolting blood crime. The Roman Catholic hierarchy formulated plans to end the practice by forcing the conversion of indigenous peoples and usurping their lands. The Aztec countered with an outsider's interpretation of transubstantiation, which claims that ritual bread and wine in Christian communion turns into the body and blood of Christ. Not only did Aztec altar murders continue, but the perpetrators of holy cannibalism also added captive Spaniards to their list of people to select for sacrifice and consumption at stone altars.

In the Marquesas Islands of the South Pacific, Norwegian expeditioner Thor Heyerdahl, author of *Fatu-Hiva: Back to Nature* (1974), found human remains dressed in tattered European garments. On Oipona terrace, he identified a temple god surrounded by heaps of human bones dating to 1887. Eyewitnesses still alive at the time of his visit attested to the propitiation of Polynesian gods with *kaikai enata* (eating people). The cannibalistic ritual required the pouring of human blood in shallow slots in a stone altar. Although on the wane, cannibalism also persisted into the 1900s in the Congo, Cook Islands, Fiji, Gold Coast, Liberia, New

Zealand, Papua New Guinea, Sumatra, and Taiwan. The practice continued into the 2000s in Brazil, Colombia, Congo, Dominican Republic, Indonesia, Pakistan, Paraguay, Russia, Sierra Leone, and Uganda.

Anthropologists have divided victims of flesh eating into those resulting from extratribal and from intertribal relationships. Consumers of human flesh reasoned that exocannibalism, the eating of organs from adulterers, deserters, enemies, pedophiles, prisoners, spies, and traitors, especially the brain and heart, disempowered the victims and redirected their might to the cannibals, a belief of the Aztec, Cambodians, Sumatrans, and some Plains and Great Lakes Indians of the United States and Canada. In Cowboy Wash, Colorado, anthropologists examined skulls and bones cracked for their marrow in 1150 C.E. and cook pots containing human myoglobin (protein) from muscle tissue, which may have been an edible trophy.

To the Kwakiutl and Tlingit of the Pacific Northwest and a warrior cult in Basutoland, Africa, eating human flesh worked tribal magic. Farther north, the Inuit consumed the heart of a convicted witch as a means of exterminating evil. Melanesians ritualized sacred corpse meals by carving special forks out of wood. Among the Kaalurwonga of the Murray River basin in Australia, cannibals ate their enemies' extremities first to prevent ghosts from pursuing the consumers on foot or from hurling spears. In 1100, the Mohawk abandoned flesh eating with the conversion from cannibalism of Hiawatha, a mythic civilizer of the Long house society on Lake Ontario.

Endocannibalism, or mortuary flesh consumption, applied the same logic to the eating of war time heroes as a ritual honor, a practice of the Dakota. Marco Polo, a visitor to the court of Kublai Khan in 1295, reported similar respectful feasting on warriors in the Andaman Islands, China, Sumatra, and Tibet. The dismembering and consumption of deceased friends and kin motivated Celtic and Peruvian tribes to console mourners with blood drinks. The ritual meal spared corpses the indignity of maggots and decay in the ground and retained beneficial spirits and strengths within the community of shamans.

Hunger extreme enough to overcome taboos has triggered one-of-a-kind episodes of cannibalism. Historians record consumption of human flesh during the Starving Time at the Jamestown colony in Virginia in the winter of 1609–1610 and among the Donner Party, pioneers snowbound in the Sierra Nevada

mountains of California during the winter of 1846–1847. Subsequent cases of starvation and famine figure in the history of the Holodomor famine among Ukrainians in 1932–1933, the Siege of Leningrad from 1941 to 1944, the Mauthausen concentration camp in Austria shortly before liberation from the Nazis in 1945, the Great Chinese Famine of 1958–1961, and the North Korean Famine of 1995–1997. After the crash in the Andes of Uruguayan Air Force Flight 571 on October 13, 1972, 27 survivors stored the dead in snowbanks to preserve them for food. For two months, they struggled to feed their bodies to help them endure hunger, pain, and cold.

See also: Columbus, Christopher; Coprolites; Díaz, Bernal; Famine; Mexican Diet and Cuisine.

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Canning

A technological advance over brining, drying, and fermenting, the canning of goods in glass or metal introduced a scientific process to the home food preserver. In 1809, to assist Napoleon's provisioners, French brewer Nicolas Appert perfected vacuum canning in glass, which he plugged with cork. The French navy

applied the technology to fruit, meat, milk, and vegetables. Food processors extended the choices of perishables available to cooks, even those in remote areas, but slow production limited the value of canned food to the French.

The following year, British grocer Peter Durand improved on bottled foods by inventing the cylindrical metal can, a boon to the Royal Navy. Bryan Donkin and John Hall put the concept into production in 1811 by packing food in tinned wrought iron. In rural agrarian enclaves and along global shores, canneries employed women and the unskilled to preserve beef, pea soup, tomatoes, and tuna. By 1818, the British navy and Arctic expeditioners William Parry and James Ross had become regular customers of canned goods, which relieved the tedium of hardtack and salt pork while reducing incidence of scurvy.

Discoveries and improvements in canning methods marked the remainder of the 1800s. Sterile conditions suppressed the deadliest food-borne contagion, *Clostridium botulinum*, which paralyzed the face and respiratory system, especially in the elderly, infants, pregnant women, and sufferers from diabetes, and compromised immune systems. At Parramatta and Sydney, Australia, in 1819, the first 1,000 colonial farmers and herders opened canneries to preserve game birds and rabbits cured in brine.

In 1824, Ezra Draggett and Thomas Kensett increased canning possibilities in heat-tempered glass, which reduced the possibility of lead poisoning from metal soldering. In 1837, Jonas Yerkes, a Pennsylvania farmer, became the first U.S. commercializer of ketchup sold in pint and quart glass decanters. By the 1850s, pressure-canned cherries, corn, peas, soups, and tomatoes increased meal selection for frontier cavalry, hospital patients, and wranglers. In 1856, Gail Borden, an inventor from Norwich, New York, preserved stable, safe milk and dairy products, providing new possibilities for travel and trail food as well as infant feeding.



Shoppers stock up on canned goods at a food bank in San Francisco. In addition to preserving food for home convenience, the process of vacuum canning creates a cheap alternative to fresh produce and facilitates the distribution of food to the needy. *(Justin Sullivan/Getty Images)*

Sturdier jars improved processing in 1858, when Philadelphia tinsmith John Landis Mason patented thick glass strong enough to withstand the boiling that rid foods of bacteria. The use of pure pickling salt created a niche market for salt makers. In 1861, Gilbert Van Camp sold canned beans in tomato sauce. The availability of cane sugar increased interest in the tart blueberry, which canners in Cherryfield, Maine, sold to Union provisioners during the Civil War. In 1866, U.S. inventor J. Osterhoudt's removable tear strip and key wind simplified the opening of commercial tins of fish. The first cans of Campbell's soup appeared in grocery stores in 1869.

The narrow-neck canning jar served home canners in the late 1860s, as did John B. Bartlett's improved metal cap secured by elastic bands. In Baltimore in 1874, Isaac Solomon refined commercial pressure canning, experimenting with calcium chloride in the processing bath, thus reducing boiling time from 6 hours at 212 degrees Fahrenheit (100 degrees Celsius) to 40 minutes at 240 degrees Fahrenheit (116 degrees Celsius). His sterilization of fruits and vegetables during the canning process increased food safety and boosted the nation's dependence on inexpensive canned goods by 600 percent.

Far from extended families, frontier wives formed female sisterhoods that furnished camaraderie during canning season, a hot chore that dominated late summer. Home food preservation involved the young in coring pears for pear preserves and scalding tomatoes for canned soup mix. Preparers held lids in place with wire bails or galvanized metal screw-on caps until 1881, when Indiana inventor Alfred Louis Bernardin designed a canning jar lid suited to high-acid foods. Families abandoned leantos and added root cellars, where stable temperatures kept glass jars from bursting during freezing weather. At the domestic tents at county and state fairs, the bright colors and shapes of green tomatoes, okra, and watermelon rind pickles generated interest in home food preservation.

Industrial Canneries

In 1893, at the height of North America's pickle mania, industrialist Henry John Heinz seized control of commercial canning at his factory in Sharpsburg, Pennsylvania. Heinz goods featured 57 pickle varieties plus bottled apple butter, baked beans, chutney, fish sauce, fruit preserves, horse radish, jelly, mustard, onions, sauerkraut, tomato and walnut ketchup, vinegar, and Worcestershire sauce. By promoting purity in his 200 products, the Heinz label earned the respect of consumers and home shoppers in every inhabited continent.

The William Underwood Company of Boston, Henry Heinz's competitor, added to canned meat selections by introducing deviled (seasoned) ground ham, chicken, turkey, tongue, and lobster. In Buffalo, New York, in 1872, suffragist Amanda Theodosia Jones patented a process of preserving fruit, meat, and vegetables by exhausting air from the container and replacing it with hot canning fluids. In 1890, she opened the Women's Canning and Preserving Company, a Chicago concern operated solely by females.

To the west, food preservation affected the course of history. In Sacramento, California, the Chinese labor force found jobs in a salmon cannery and, in 1876, at Joseph Routier's fruit cannery, where they hand made and soldered tin cans. The Hudson's Bay Company prospered from the sale of canned fish in North America. In the 1880s, the market for inexpensive canned meat increased the

slaughter of baleen whales, a popular meat on the Atlantic Coast.

At the beginning of the twentieth century, Louise Andrea's *Home Canning, Drying and Preserving* (1918) featured photos of a preparer in an impeccable cook's uniform sterilizing jars. Her instructions covered the standard vegetables plus corn on the cob, Creole sauce, succotash, tomato paste, and tutti frutti. Guilt-producing ads in women's magazines hyped canned goods to improve children's diet, particularly evaporated milk. Sears supplied isolated farm wives with pantry needs, including canned fruit and sauces. The 1923 Sears catalog listed canned seafood, 25 varieties of canned vegetables, and ready-to-use fruit pie mix. For quick meals, Sears warehoused tinned clams, kippered herring, mock turtle soup made from calf offal, salmon, sardines in oil, shrimp, and smoked haddock.

In 1919, Freda Ehmann's olive cannery in Oakland, California, closed from the negative publicity of a botulism outbreak that killed 35 people. Temporarily, the news destroyed consumer confidence in safe canning techniques. Growers fought the toxin by sterilizing fruit containers with steam, rejecting windfalls and bruised fruit, removing picked fruit immediately from field contamination, and processing at 250 degrees Fahrenheit (121 degrees Celsius). A year later, Meyer Edward Jaffa, professor of nutrition at the University of California, reassured consumers that they could safely eat canned ripe olives.

Commodifying Perishables

The first quarter of the twentieth century brought the commodification of perishables to new heights. Industrialists profited on canned fruit concentrates, commercial chili powder and canned chili con carne from Texas, Heinz and Nestlé baby food, and sliced pineapple, a popular salad and dessert additive processed at Hawaiian plantations. Green beans and mushrooms, sliced and canned in factories, came to the table in uniform bites and consistent quality. Canned hearts of palm added texture to salads, soups, and stir-fries.

Infantry cooks during World War I dismayed frontline soldiers with a daily ration of British "bully beef" (corned beef), French canned chicken, and Italian spaghetti in meat sauce. Ensuring quality, the double seam protected tinned goods during lengthy convoys over rough terrain. During World War II,

American farm agents opened neighborhood canneries as a hands-on teaching experience for homemakers in preserving the harvests of their Victory Gardens. In 1944, singer Kate Smith praised the women who preserved vegetables from some 20 million home plots. Overall, civilians raised 40 percent of their vegetables and canned 4.1 billion jars of food.

During the Korean War in 1950, Korean peasants survived starvation by acquiring from U.S. military supply canned ham and Spam, a chopped-meat product sold under an acronym for “shoulder of pork and ham.” Native cooks nationalized recipes by flavoring tinned meat with chilis and *kimchi* (fermented vegetables). In 1966, food processors commercialized Korean ingenuity by canning kimchi for export.

The 1950s rid the canning industry of metal difficulties by applying flexible, lightweight aseptic packaging developed from laminated aluminum, nylon, polyester, and polypropylene. Cartons and retort pouches, a stackable type that holds U.S. military field rations, kept shelf stable for months a variety of perishables—chocolate drinks, coconut, custard, fruit juices, gravy, rice meals, soup mix, and tuna.

In 2007, U.S. food technologist Philip E. Nelson won the World Food Prize for his practical application of bulk aseptic processing and packaging to solving world hunger. The Tetra Pak, made in Lausanne, Switzerland, added a new wrinkle in canning—convenience and low cost as well as recyclable polyethylene.

See also: Disease, Food-Borne; North American Diet and Cuisine; Nutrition; Packaging; Poisonous Foods.

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Cantonese Diet and Cuisine

Imaginative Cantonese cuisine, the food of Guangdong Province, in southern China, acquired variety and innovation from local ingredients and the imports of the nation's first open port (Canton, or Guangzhou). The humid coast thrived on productive rice paddies, livestock, and agricultural abundance, including taro, tropical lychees and mangoes, and yams. New ideas—coconut milk and rice noodles from Thai cuisine, ginseng from Korea, mangoes from Vietnam, and peppers and tomatoes from Mesoamerica— expanded traditional pantry stock.

Because of the availability of just-caught seafood, Cantonese gastronomy developed recipes for abalone, jellyfish, octopus, sea cucumbers, shark fins, and squid. From 1600 B.C.E., Guangdong cooks served cat and dog meat and gained a reputation for turning any meat or plant into an edible. After 206 B.C.E., the kitchen stove and wok replaced hearth cookery with a more flexible heating method than the use of iron cauldrons. From the second century B.C.E. along the Silk Road, cooks adopted coriander from Bactria, curries from India, and peaches from Samarkand. Persian traders, who introduced figs in Guangdong, welcomed relaxing morning and afternoon snacks of tea with dim sum (dumplings), tidy bites of meat and seafood wrapped in bamboo or lotus leaves.

A Heritage of Balance

From the publication of some of Guangdong's 2,000 recipes after 220 C.E., chefs earned a reputation for balancing the colors, flavors, and mouthfeel of dried and fresh ingredients. To highlight entrées, they limited the degree of spicing with chilies, mustard, oyster sauce, sesame, and vinegar. Their sensibility for subtle taste derived from Fujian cooks and Hakka nomads of the East River valley in central China traveling south in 317. The transients initiated the practice of cooking chicken in heated salt or hot soup. In the 600s, *koe-chiap*, a Cantonese fish brine flavored with herbs and spices, added the first “ketchup” to table condiments; stir-frying from Chaoshan to the northeast created a deft technique for rapid heating.

In the 1700s, Indonesian Muslims conducted a triangular trade with Australian

Aborigines at Exmouth to supply edible invertebrates to Canton, particularly sea cucumbers for aphrodisiacs and dried and smoked gourmet dishes. A century later, vendors at Hong Kong's street stalls deep-fried *char siu* (barbecue pork) turnovers, ling balls, skewered meatballs, and vegetarian spring rolls. With sit-down snacks, waiters served bubble tea with tapioca pearls, noodles, oolong tea sweetened with evaporated milk, and rice *congee* (gruel).

Heritage dishes made the most of braised or poached beef brisket, chicken and duck eggs, cod bladder, frog's legs, pork ribs, scallops, shrimp, and squid. To meats, cooks wedded black beans, crab roe, fermented tofu, fried taro, pickled cabbage and daikon, and shiitake mushrooms. For light Cantonese desserts, menus featured sweet soups of red beans, sesame, and sweet potato as well as coconut candies, custards, ices, and mooncakes, a fall holiday pastry. A curative for skin ills, turtle jelly involved grinding together smilax root and the bottom shell from *Cuora trifasciata* (aquatic box turtle). The endangered reptile, which investors raised on farms and sold in Guangzhou's Qing Ping market, fueled a multibillion-dollar industry that spread to Hong Kong and Macau.

A Global Cuisine

The Cantonese diaspora from the Great Central Plains of the Yellow River carried regional recipes to Australia, California, Hawaii, India, Malaysia, the Philippines, and Singapore. During the importation of coolie labor to build the transcontinental railroad from California to Missouri in the mid-1800s, Guangdong tastes and techniques became the first to influence North American restaurants along the track. The migration of Cantonese cooks to Taiwan in 1949 introduced *shacha* hot pot cookery, an ancestral form of shared one-pot meals.



The location of Guangdong Province on the coast of the South China Sea makes seafood prominent in Cantonese cuisine; strong spices offset the fishy smell. Fish tanks are commonplace at restaurants and markets. (Randy Olson/*National Geographic/Getty Images*)

In the 1980s, the Cantonese crock boiler became a national fad for simmering one-dish meals and restorative soups southern-style over a low flame. A family and takeout specialty, *lo foh tong* (slow-simmered soup) began as a clear consommé of fungi, crab, melon, or watercress, often enhanced with healing herbs. The closure of many urban street stalls in the 2000s forced the service of fried cuttlefish and wontons and skewered poultry gizzards indoors to cleaner, air-conditioned cafés. In April 2009, a letter to the *China Daily* protested the banning of roadside food service and ensuing joblessness.

Presently, Cantonese menus feature a range of meats, from bear, beef organs, chicken, duck, and monkey brains to lobster, prawns, salamanders, scallops, shrimp, snails, and snakes. A sapid restaurant fare compared to the bold savor of Szechuan, Thai, and Vietnamese cookery, lightly spiced Cantonese dim sum, either steamed or stir-fried, showcases the flavors of meat, rice, and vegetables. Favorite enhancements—cornstarch, jasmine syrup, longans, onion, oyster sauce, rice wine, salt, sesame, soy sauce, sugar, and vinegar—and sparse amounts of chili pepper and ginger allow the basic ingredients to dominate.

See also: Mandarin Diet and Cuisine; Pork; Szechuan Diet and Cuisine; Tea.

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Caravans

A means of transcontinental food trade from prehistory to the present, trains of domesticated pack animals have conveyed goods and passengers, bringing together consumers and exotic foodstuffs. Persians initiated the camel caravan, which linked North Africa and Arabia with the Middle East, China, and Outer Mongolia by convoys of asses, donkeys, double-humped and single-humped camels, horses, mules, oxen, and yaks. From bartering and swapping, traders and travelers engineered a global cuisine out of luxuries—alfalfa, asafetida, caraway, citrus fruit, coriander, cotton, eggplant, figs, millet, olive oil, quince, and sugar beets.

The taming of the camel in 1500 B.C.E. increased the efficiency, safety, and speed of caravanning. Each animal bore up to 400 pounds (180 kilograms) of goods during a journey that could last from a month to a year. After 500 B.C.E., the invention of the saddle and copper or leather shoes for the animals increased the flexibility of camel trains. The outreach ensured wheat for bread and bulgur in Ankara, Turkey, dried meat in Alexandria, Egypt, and ginger and tea in Kyakhta, a nexus separating northern Mongolia from Russia.

Caravanning involved Afghan and Berber route managers in balancing panniers or sacks on either side of each beast for daily journeys from 10 to 25 miles (16 to 40 kilometers). Nearly one-quarter of the cargo consisted of fodder

for the dray animals. Cameleers connected camels with a hair nose-rope and led a file of 15–18 animals with a leash attached to the nostrils of the foremost animal. A full caravan consisted of 8–10 files. Each night, the caravan halted for animals to graze and receive first aid for foot lesions and pack sores. Upon arrival at an outpost, the supercargo (master trader) negotiated deals.

Caravan Cities

The trade routes promoted food markets in caravan cities, such as Aleppo, Syria; Benghazi and Tripoli, Libya; Fez and Marrakech, Morocco; Irkutsk and Orenburg, Russia; Lhasa, Tibet; Tabriz, Persia; and Trebizond, Armenia. One trade route city, Palmyra in south-central Syria, maintained a neutral junction that enabled Parthians and Romans to conduct peaceful business in spices and tea arriving from China and India. The Roman general Pompey Magnus ousted the Nabataeans from Petra, Jordan, in 63 B.C.E. and set legions over the trans-Jordanian caravan to end banditry. Under the Emperor Augustus, after 27 B.C.E., a frenzy for exotica developed culinary fads for chickpea fritters, dried eels and sturgeon, Persian lemons and saffron, pickled cucumbers, and Syrian marjoram.

From 300 to 1300 C.E., caravanning furthered international transport of foodstuffs and livestock, delivering Arabian and Indian dates, grains, horses, wheat, and wine to eager buyers in the Fertile Crescent and Egypt and among the isolated Berbers of North Africa. Trains moving east to markets around the Sahara Desert carried Arabian almonds and yogurt; Cantonese lotus seed and rice wine; Indian cardamom, curry spices, and dal; Syrian mutton; and Tientsin brick tea. The caravans returned with Abyssinian coffee, Algerian dates, Bedouin dried cheese, Garamantian olive oil and wine, Libyan sheep, and Malian kola nuts and salt from Timbuktu. With exchanges came details of clotting milk with rennet and clarifying grape wine with resins, food technology that expanded period cuisine.

Herodotus, the Greek historian, acknowledged the importance of long-distance caravanning to commerce and the importance of safety to trade along routes in Asia, North Africa, and southeastern Europe. He also commented on caravansaries, the inns that accommodated coffee, pistachio, and spice merchants

over 1,500 miles (2,400 kilometers) from Susa in Persia to Sardis, Turkey. The availability of food and water eased the burden of packing. While convoy leaders rested at a caravansary their servants tended animals and, in nearby stalls, guarded packs from robbers and sandstorms. In private, drivers shared cucumber and dill seeds for kitchen gardens as well as tips on clarifying butter into ghee and using natural yeasts to raise bread.



Moroccan traders lead a camel train from Ouarzazate to Algeria, following the ancient trade route from Spain across North Africa. The camel's ability to survive harsh conditions has been vital to desert trade and communication for thousands of years. *(Ton Koene/Gamma-Rapho/Getty Images)*

The Modern Era

In the 1400s C.E., Portuguese water transport competed with overland caravans for trade in crated and sacked goods, including coconuts and copra. In 1581 in Lower Galilee, Israel, Sinan Pasha, the Ottoman grand vizier, built a caravansary on Mount Tabor, where Syrian drovers herded cattle and horses to market. Caravanners traded with Palestinians from Nablus in apples, barley, cheese, eggs, figs, grapes, melons, poultry, raisins, rice, sesame, sugar, vegetables, and wheat.

In 1784, construction of the Khan al-Umdan caravansary at Acre in northern

Galilee provided caravans with a grain and produce warehouse on the Mediterranean. When caravans reached Africa, eastern merchants encountered melegueta pepper, okra, and watermelons and secured seeds for Arabian gardeners. The creation of international borders and passport control initiated a decline in caravanning. Still, 12 years after the November 17, 1869, completion of the Suez Canal, Baghdad merchants dispatched 2,000 camel loads to Damascus.

In 1866, the importation of 109 camels to New South Wales, Australia, from India and Palestine enabled Afghan traders to supply food to outlying stations. Harnessed like bullocks in colorful cording and announced by tinkling bells, a team of four could pull a wagon and 4-ton (3.6-metric ton) load 15 miles (24 kilometers) per day. During the 1881 drought, dromedary deliveries of food and iron tanks of water rescued miners in the Albert goldfields. Caravanning continues to deliver foodstuffs to areas remote from highways and airstrips. *See also:* Ibn Battuta; Polo, Marco; Silk Road; Trade Routes; Trading Vessels.

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Carbonation and Carbonated Beverages

The invigoration of fluids with nontoxic carbon dioxide (CO₂) gas dissolved in water adds bounce and fizz to otherwise flat drinks. From prehistory, people favored natural effervescence in mineral waters as sources of health and the restoration of well-being. From a German spring site at Niederselters, near Wiesbaden, sparkling water acquired the name *seltzer*. In 1728, citizens juggled

and corked the water and sold 600,000 stoneware jugs per year. The French dubbed the German water “*eau de seltz*”; Italians called it “*acqua di seltz*.”

The first bottled pop to enter history lay in the sun around 1600. Puritan theologian Alexander Nowell, dean of St. Paul’s Cathedral in London, noted that the uncorking of the warm ale produced a bang and foam. In 1767, English chemist Joseph Priestley, a Yorkshireman from outside Leeds, aerated the first glass of artificially carbonated water with CO₂. Swedish physicist Tobern Olof Bergmann of Katherinberg mechanized the process in 1770 by creating a machine that dropped sulfuric acid on chalk (calcium carbonate) to release CO₂ gas into liquids.

The manufacture of seltzer water in Stettin, Germany, in 1783, preceded similar businesses in France and England. King Frederick II funded the first operation to reduce alcohol imports. Medical applications of bubbly water became easier to swallow in 1807, when Philadelphia physician Philip Syng Physick first flavored carbonated curatives, which evolved into medicinal birch beer and sarsaparilla. In 1815, research chemist Frederick Struve of Dresden formulated the first artificial mineral water that bore the same carbonated qualities of natural springs. A decade later, he operated a pump room as a spa.

American inventor John Mathews enhanced the popularity of bottled drinks in 1832 in Charleston, South Carolina, with a carbonation machine. He sold his devices to drugstores as soda fountains. To these rough beginnings, pharmacists added alkaloid drugs; soda water marketers boosted appeal with aromatics and flavorings, forerunners of the first cola beverage, formulated in 1881 with the kola nut, an African stimulant and analgesic. Within the century, bottlers of ale and champagne exploited the gaseous discharge by fitting glass-bottled drinks with cork and a thread and adding caffeine to punch up the effects of effervescence.

By the late 1800s, soda pop makers extended the concept of bubbly water into exhilarating sweetened beverages, some marketed as patent curatives. In 1885 pharmacist Charles Alderton of Waco, Texas, concocted Dr. Pepper, a carbonated refresher high in cane sugar. The invention of the crimped or crown metal bottle cap in 1892 ensured that bottled drinks retained their fizz an essential to Coca-Cola, which pharmacist John Pemberton formulated in 1886. Reducing prices on gaseous drinks, the glass bottle machine, patented in the United States in 1899,

blew blobs of molten glass into shapes more convenient for holding in one hand than previous stoneware jugs.

In the ensuing decades, carbonated beverages gained recognition as beneficial drinks for the sick. In the 1920s, the National Jewish Hospital for Consumption declared carbonation a means of slowing the advance of consumption with carbonic gas, which reputedly destroyed the tuberculosis bacillus. In Holland, dairiers discovered that carbonation prolonged the shelf life of butter.

Conveyor systems and mechanical filling apparatuses during the Great Depression expanded the use of carbonation to root beer and chocolate drinks. Bottlers proclaimed carbonated drinks safer than milk because no human hand touched the product during processing. To ensure sanitation, an amendment to the Federal Food and Drug Act in 1934 set standards for processing and gas delivery to liquids. Two years later, the reduction of spoilage in orange drinks allowed the marketing of carbonated beverages similar in appearance and flavor to orange juice.

Further applications of carbonation to food brought more enticing improvements. In 1952, consumers had access to the first diet soft drink; six years later, carbonated drinks appeared in aluminum cans. The invention of the pop-top in the 1960s and vending machines in the 1970s increased convenience. By 1991, containers shifted once more to polyethylene terephthalate (PET), which seized 25.6 percent of the carbonated bottling market. An inversion of food fads in the 1990s returned carbonated water to favor, making it the second most popular drink after colas.

In 1999, the International Society of Beverage Technologists set standards for the quality of CO₂ gas in beverages. The guidelines covered the mouthfeel of carbonation as well as the safety and purity of gas, which distributors typically filtered through carbon. In the twenty-first century, concern for osteoporosis produced a backlash against carbonation, which appeared to leach calcium from bones and teeth. In April 2010, environmental researchers linked PET with endocrine disruptors, a supposition about packaging of carbonated drinks that remained unsubstantiated. Today, in the United States alone, some 500 bottlers fill and seal 2,000 cans per minute of more than 450 different types of carbonated soft drinks.

See also: Packaging; Snack Food; Soft Drinks and Juices.

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[Carême, Marie-Antoine \(1784-1833\)](#)

The celebrated “King of Chefs and Chef of Kings,” Marie-Antoine Carême elevated French cuisine to baroque style.

Born on June 8, 1784, Carême came of age during the French Revolution. At age 11, he lived abandoned on the streets of Paris and worked as a tavern potboy. At age 14, while educating himself at the Bibliothèque Nationale, he studied pastry under Sylvain Bailly and mastered displays of marzipan and spun sugar in the shape of classic arches and temples.

Carême’s artistry included the creation of meringues and nougats, which he mounted on centerpieces at his boutique, La Pâtisserie de la Rue de la Paix. In March 1810, he baked a wedding cake for Napoleon’s union with Marie Louis of Austria. From this era, at age 31, he published *Le Pâtissier Royal Parisien (The Royal Parisian Confectioner, 1815)*.

By advancing his range to include all dining menus, Carême won a position at Château de Valençay, outside Paris, under the supervision of the diplomat Charles-Maurice de Talleyrand, a noted gourmand. To secure the post, Carême plotted a year’s menu using seasonal herbs and vegetables. From Carême’s inventive entrées, especially his signature soufflés tinged with gold, Europe’s

leaders acquired elevated tastes. Abandoning a holistic presentation known as *service à la Francaise*, diners anticipated courses offered via *service à la russe*, the separation of dishes for a unique presentation at each stage of the meal.

Carême spread what aficionados called the “first table in France” with such fare as Robin Redbreast pies and Bavarian creams. His service to royalty took him to London in 1816 to make pâté for the future king George IV at the Royal Pavilion at Brighton and, in 1819, to the Romanov kitchen as maître d’hôtel to Czar Alexander at St. Petersburg, Russia. His peripatetic cookery took him to diplomatic conferences at Minoritenplatz in Vienna and back to Paris in 1824 to superintend food service to financier Baron James de Rothschild, founder of a commercial dynasty.

Carême set out to rid refined tables of excessive spicing. He categorized the mother sauces as béchamel (white sauce), espagnole (brown sauce), hollandaise (butter sauce), and velouté (blond sauce). For the elite, he combed markets at Les Halles in Paris for calves’ udders, cocks’ teats, Isigny butter, and truffles, which he served with the best of Mocha coffee and champagne. In payment, the Rothschilds set his salary at 8,000 francs a year. For harmonizing flavors into a satisfying table experience, the chef crowned himself with the white toque, a hat that still marks the cook as a professional.

Carême worked as one of the last master chefs in private employ. During his residence in royal houses, he gleaned useful information from foreign diners to strengthen national security. To maintain his notoriety, he designed and named entrées for aristocrats—Pottage à Lady Morgan, Salmon à la Rothschild, Vol-au-vents à la Nesle. His set of decorative cooking swords skewered shrimp to whole fish. His subtly scented banquets pleased as many as 10,000 at a time.

Carême appears to have died of carbon monoxide poisoning from cooking over a charcoal fire without adequate ventilation. At his death at age 48, he towered over other chefs as the creator of French haute cuisine. He left unfinished his five-volume encyclopedia *L’Art de la Cuisine Française* (*The Art of French Cuisine*, 1833–1834), a compendium of his table settings, menus, and recipes. The completed three volumes covered the history of French gastronomy and plans for efficient kitchen layout. Central to his advice, education for cooks raised the level of discourse concerning fine fare and impressive table decor.

See also: Haute Cuisine; Pastry; Potatoes; Restaurants.

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Caribbean Diet and Cuisine

A crossroads table experience, Caribbean cuisine combines the ingredients and cooking techniques of Arawak, Taíno, Carib, Spanish, African, British, French, Dutch, Scandinavian, Chinese, and Indian inhabitants. The Arawak developed the barbeque, a unique enhancement of slow-cooked birds and ducks with savory green wood smoke. The Taíno introduced the one-pot meal simmered in clay urns, with bivalves, fish, land crabs, manatee, and turtles mixed into a chowder flavored by cassava, corn, guava, pawpaw, and yams.

On Dominica, Grenada, St. Vincent, and Tobago, the Carib shared with the Taíno the mounding of leaves into vegetable gardens called *conuncos*. On each, cassavas, cubanelle peppers, lima beans, pumpkins, squashes, and starchy tubers grew together in a single clump such that something was in season year-round. From cassava, cooks made tapioca pudding, which doubled as a dentifrice. A subtle culinary addition from the Carib united tarpon and wild boar with lemon and lime juices and pepper sauce, one of the distinct recipes of the West Indies.

The least sophisticated West Indian meals come from Antigua, Barbuda, Dominica, Grenada, Montserrat, Nevis, and St. Kitts. Because these small islands relied heavily on imported seafood and vegetables, their standard table spread

featured fresh meats, frog's legs, and produce for fish soup. To dockside offloads, after 1698, African slaves laboring on sugar plantations added from their yard gardens ackee, bananas, cornmeal, mango, okra, peanuts, and plantains.

Grenadans regularly feasted on callaloo with crab, oil down from salt cod cooked in coconut milk, and queen conch souse marinated in lime juice. Antiguans and Barbudans refined meat into pepper pot soup by adding *cassareep*, a fermented cassava juice cooked into a syrup and sweetened with brown sugar, cayenne, cinnamon, cloves, and salt. The antiseptic quality of cassareep kept foods safe for lengthy canoe journeys. A side dish of *fungi* combined two North American foods, cornmeal and okra, into a pudding. Dominicans developed a unique fried chicken recipe that began with the marinating of chicken in garlic and lime. Rolling in herbed flour preceded frying in oil.

Post-Columbian Cuisine

After the arrival of Spanish foodstuffs on Christopher Columbus's fleet in fall 1492, Cuban cookery, the earliest multicultural food in the West Indies, infused Andalusian recipes with Taíno and African methods and ingredients, including boniato and malanga tubers and *roucou*, an herb integral to picadillo sauce. From the island's history, cooks retained the omelet and the croquette, a mincing of conch and vegetables for binding with mashed tubers, milk, and egg and rolling in cassava flour for deep-frying.

Spanish grilling methods varied island menus. The empanada, a filled turnover, produced a similar marriage of textures and flavors, both savory and sweet. The Cuban sandwich served grilled Swiss cheese and ham on sweet *pan cubano* (Cuban yeast bread) with mustard and pickles, sometimes accompanied by a side dish of *Moros y Cristianos* (black beans and rice), wittily named for the Iberian face-off between black Moors and white Christians. When Cuban immigrants took their cuisine to Florida, culinary history dubbed it "Floribbean."

From similar roots, Puerto Ricans adapted Taíno, Mesoamerican, and Ethiopian tastes into a unique *cocina criolla* (Creole cookery), notably barbecued pig's ears, snouts, and tails flavored with an adobo spice rub blended from garlic, onion, oregano, pepper, and salt. Cooks stewed *arroz con gandules* from rice and pigeon

peas, the island's national dish. To bland staples, they wrested flavor from annatto, bay leaves, capers, cumin, ham, olives, and *sofrito*, a combination of annatto seed, chili pepper, cilantro, garlic, ham, onion, and oregano sautéed in lard. To wed spice to vegetable, they cooked the mix with a topping of banana leaf or plantain.

Jamaican cuisine, impacted by Danish and Portuguese sailors and British colonizers, developed *escabeche* (poached fish), "stamp and go" (cod patties), dunkanoo (corn dumplings), and ackee and salt cod, the national dish. From the British colonization of India, island cooks turned curried goat into a specialty along with moist, tender jerked chicken and pork cooked over pimiento wood and accompanied by kidney beans, pigeon peas, and rice. A flair for bright red pimiento and Scotch bonnet or habañero peppers and tomatoes and the fragrance of allspice, onions, and thyme heightened the sensual appeal of Jamaican jack fish and marlin dishes. A popular street food reflecting Rastafarian vegetarianism, aloo balls derived from mashed potatoes spiced with cumin and turmeric for deep frying and eating with Blue Mountain coffee, introduced on the island in 1728 from Martinique.

In the Lesser Antilles, Guadeloupe, Marie-Galante, Martinique, St. Bart's, and St. Martin adapted island ingredients to French cooking methods. To *machoui* (spit-roasted mutton), island cooks added egg dishes and elegant displays of carved pineapple and mango. A one-dish specialty, *pâté en pot* began with chopped lamb cooked into a stew flavored with basil, chili, and lemon and baked in a *tourtière* (pie pan). Simple luncheons involved the mincing of fresh vegetables into rice salad, a vegetarian dish soaked in a refreshing vinaigrette or yogurt.

Haiti, another French island, incorporated African cookery to produce *boulets* (bread-bound meatballs), blackberry or dewberry desserts, and *riz et pois colles* (rice and kidney beans). Saucing with béchamel from milk, *coquimol* from coconut, and *sauce ti-malice* from chili reserved local flavors in French-style creaming and whipping to top dishes featuring seafood and small, dark *djon djon* mushrooms. The Dominican Republic claimed as its national dish *sancocho*, a stew of *longaniza* (pork sausage) served with avocado over rice.

Immigrant Cooking

After the emancipation of slaves in the 1770s, the importation of Chinese laborers to sugarcane fields added bean curd, bok choy, mustard, and rice to the multinational cuisine. From Polynesia, English botanists brought breadfruit to the Grenadines, Jamaica, and St. Vincent. As beet sugar reduced the profits from cane sugar, growers began devoting more farm space to cinnamon, cloves, coconuts, corn, ginger, nutmeg, pineapples, soursops, and yams. The veritable rainbow of flavors spiced fish chowder, conch salad, and stewed shark.

Chinese-Caribbean style incorporated Asian cooking methods and textures for curried duck, fried chicken, and pork with egg noodles, a favorite in Jamaica. Stir-frying encouraged the quick heating of local greens with minced meats for a crisper mouthfeel and lighter meal. Stuffing vegetables with ground fish contributed a common variant on seafood fried in oil.

A favorite dessert, konkee involved the wrapping of bananas or plantains in banana leaves for boiling in spiced coconut milk. Bush tea, ginger, guava, jujube, passion fruit, and tamarind contributed juices for refreshing nonalcoholic beverages that also restored health and vigor. More bracing drinks—daiquiri, malta, mauby, mojito, pina colada, rum punch, and sangria—were served to tourists and visitors.

North of the South American coast, Barbados created a regional Bajan Seasoning, a blend of green onions, marjoram, parsley, and thyme. Breakfast menus focused on fried flying fish, a tender, flavorful meat redolent with lime juice and served with steamed christophene (chayote). A peasant black pudding combined pig blood with rice for stuffing pig intestines. On Barbados Independence Day each November 30, hosts served platters of fish cakes and conkies, a fritter made from cornmeal, coconut, pumpkin, raisins, and sweet potatoes wrapped in banana leaf.

Likewise, Tobago and Trinidad imbued recipes with the taste and texture of coconut and sweet potatoes, which accompany coucou, a cornmeal mush, and pelau, a mix of rice with peas and pork. For *buljol* or cod bake, cooks shredded fish and blended it with coconut, olive oil, onion, pepper, and tomatoes. An accompaniment from India, roti, a griddle-baked wheat bread, wrapped around chutney, curries, and salsas to make them easier to eat. A patio favorite, Spanish pastelles consisted of corn pastries steamed in banana leaves.

Today, the popularity of the Caribbean diet derives from its emphasis on fresh produce and vibrant flavor. The combinations of fish, fruit, legumes, and vegetables bolster the diet with antioxidants, iron and potassium, omega-3 acids, vitamins A and C, and calcium. For the sake of wellness, roughage stabilizes blood glucose and regulates the colon. Dry rubs and liquid spice mixes invigorate digestion and suppress hunger.

See also: Barbecue; Breadfruit; Columbus, Christopher; Jerky; Manioc.

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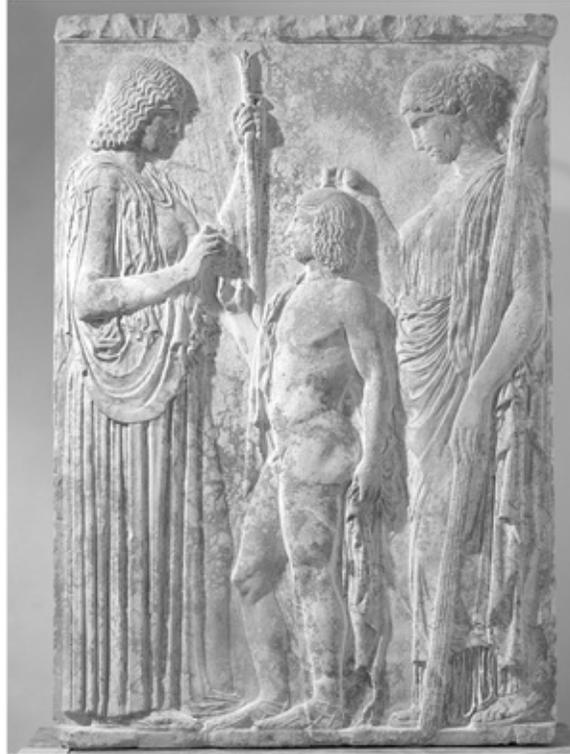
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Cassava

See Manioc



Demeter, the ancient Greek goddess of corn and the harvest (the counterpart to Ceres in ancient Rome), presents corn to the hero and demigod Triptolemus. In Greek mythology, Demeter taught Triptolemus the art of agriculture, which he disseminated to the rest of Greece. (*Dea/G. Dagli Orti/De Agostini/Getty Images*)

Cereal

The history of diet identifies cereals as the products of ubiquitous grains and grasses that nurture humankind. Emmer wheat sustained farmers in Israel from 17,000 B.C.E., some 5,000 years before humankind added einkorn wheat to Paleolithic cuisine. Around 11,050 B.C.E., after the settlement of Abu Hureyra in western Mesopotamia (Syria), a millennium of drought forced hunter-gatherers to sow and harvest the hardiest wild seeds, beginning with rye and advancing to barley, a nutritious cereal grain.

Parallel to these ancestral grasses of the Fertile Crescent, West Africans from Cape Verde to Lake Chad subsisted on *fonio*, a fast-maturing grain cultivated on dry, infertile savannas and made into couscous. Like Mediterranean myths, Malians considered fonio the grain from which the world evolved. Its unique

taste made it popular with Malian and Nigerian chiefs and kings and as a remunerative bride price in Benin, Cameroon, Guinea, Senegal, Sierra Leone, and Togo.

Paleoethnobotanists have tracked the emergence of cereal crops in early civilizations. Developments in subsequent edible grains introduced dominant species region by region:

12,000 B.C.E.	rice	China
10,000 B.C.E.	wild rice	Great Lakes of North America
9600 B.C.E.	wheat	Iraq, Jordan
8500 B.C.E.	barley	Palestine
8300 B.C.E.	millet	China
6000 B.C.E.	amaranth	Mexico
5800 B.C.E.	quinoa	Peru
5000 B.C.E.	spelt	Caucasus
4000 B.C.E.	buckwheat	Japan
4000 B.C.E.	teff	Ethiopia
3200 B.C.E.	oats	Europe
1800 B.C.E.	rye	central Europe
1000 B.C.E.	sorghum	India, Pakistan

For harvest chores, growers created tools—the scythe, flail, basket fan, and winnowing fork. Threshing and wind winnowing enabled ancient communities to separate lightweight chaff from the nutritious grain. To accommodate preparers of cereal, potters molded earthenware into specific shapes for steaming cereal grains.

Cereals and Civilization

During the rise of agriculture, around 8000 B.C.E., and the addition of cereals to diet, humans declined in both body mass and well-being. Anthropologists noted a decrease in human height and the size of the bite as well as a spurt in dental decay from sticky carbohydrates clinging to teeth. As a result of community

formation around productive fields, population density rose from one to 15 persons per square mile (from less than one to about six persons per square kilometer). The seasonal production of grain sustained the growth of communities into cities, where citizens pursued nonagrarian jobs and artisanal crafts.

Cereals introduced the young to adult foods. The shift from rough grains to porridge allowed women to wean infants sooner and to substitute pap and gruel for breast feeding. During the transition, the semiliquid cereal required no chopping or pureeing, offering mothers a shortcut to child feedings. The substitution of cooked cereals for breast milk shortened the period of nursing and thus the span between births.

Grains increased the range and complexity of barter systems. In sub-Saharan Africa after 1500 B.C.E., growers packed lightweight dried pearl millet, copra (coconut meat), and fish for trading in rural communities along major waterways. As far east as India and west to Spain, millet sold well as a parched grain, steamed couscous, and source of porridge, but it required immediate use rather than lengthy storage, for which it was unsuited.

Syrian author Ibn Sayyar al-Warraq summarized the Abbasid foodways of the Arabo-Islamic bourgeois in *Kitab al-Tabikh* (*Book of Dishes*, ca. 950 B.C.E.). The text enumerated recipes for cereal grains, including toasted wheat for travelers and *murri*, a fermented condiment revered as “the essence of food.” Al-Warraq compiled innovative combinations of grain with beans and vegetables and seasoned wheat dishes and a stew of lentils, rice, and white beans with black pepper, cassia, galangal, and onion and a dollop of fat. His dietetic regimen for invalids centered on grain stews and rice porridge, which he also prescribed for indigestion and upset stomach. For barley broth, a reliever of respiratory congestion, he indicated slow cooking in a double boiler. He preferred his cereal dishes cooked fluffy and chewy in a *tannur* (clay oven) rather than creamy or mushy in a cauldron. For flavor, he suspended a roasting chicken, lamb, or beef ribs above the pot and allowed meat drippings to add complex flavors.

The Greeks valued cereal as a source of social change. Philosophically, diners acknowledged the civilizing aspect of cereal by which Demeter, the goddess of cereal grains, socialized bestial meat eaters and introduced mealtime courtesy and the sharing of communal dishes. In Bronze Age Greece, mythology about

Demeter depicted her assigning Triptolemus, a chief of Eleusis, to sow cereal grains to feed the world. A standard rural meal among northern Greek pastoral people involved the boiling of einkorn flour with salt or wine must and either milk or water to produce a mildly sweetened porridge.

Cereals gained respect for providing more food energy than any other crop. Around 300 B.C.E., encyclopedist and educator Theophrastus of Lesbos evaluated cereals and pulses as grains useful as famine provisions for their ease of storage. Augustus Caesar's forces appear to have introduced hearty emmer wheat cereals to Italy after the Roman invasion of Egypt in 30 B.C.E. As the basis of farina, emmer wheat became the source of cooked porridge that dominated Roman *cena*, the main meal of the day. Cooks enhanced the blandness of barley with chopped garlic, leeks, and onion and sweetened oat gruel with honey.

Boosting Nutrition

In the early Middle Ages, watermill patrons could choose to retrieve the middlings for cereal or grits and to keep the bran in unbolted (unsieved) meal as a source of fats, minerals, protein, and vitamins. Both ingredients satisfied hunger while keeping food costs low. For the lowest-class Byzantine, barley and emmer wheat cereals and legumes stocked the communal pot. Armies subsisted on double-baked biscuit and cereal pottage washed down with wine.

After the Crusades, in the thirteenth century, the English began incorporating Levantine and Sicilian groat dishes in their diet. One example, the standard English porridge, became the oldest national dish. It acquired character as frumenty (or fermenty), cracked wheat cereal boiled in milk and flavored with fruit, spice, and sweeteners. Additives ranged from almonds, currants, and egg yolks to orange flower water, rum, saffron, and sugar.

In the early Renaissance, cereal cookery remained essential to stamina worldwide. During the Ming dynasty, which began in 1368, imperial Chinese food service required a cadre of 5,000 kitchen workers to plate the main meal of the day. Presented around 2 P.M., the courses featured entrées alongside cakes and cereals. After the Spanish conquest of the Americas, conquistadors discovered that the Inca kept their soldiers healthy on dried fish and quinoa, a common

cereal grain. The Aztec ground corn for *atole*, a staple porridge flavored with chili and salt for eating from a spoon or sipping as a beverage. In Poland, *kasha* (buckwheat cereal) earned the title of “Jewish soul food” for sustaining families over a millennium.

American cooks associated cereal cookery with sustaining babies and the sick. In 1854, Bostonian writer Sarah Josepha Hale, author of *The New House hold Receipt-Book*, advocated gruel as a food for toddlers. Her varied list of sickbed meals included cornmeal mush and oatmeal, both easily digested. For babies for whom cow’s, goat’s, or sheep’s milk proved unpalatable, in 1867, German-born pharmacist Henri Nestlé of Vevey, Switzerland, formulated *Farine Lactée* (milk cereal), a powder of sweetened condensed cow’s milk and malted wheat rusks. In the 1870s, he marketed it in the United States as an intermediate food under the logo “Best for Babies.”

In 1877, the Quaker Mill Company of Ravenna, Ohio, popularized cooked oats as the mainstay of the breakfast menu, providing something “warm in the tummy” for schoolchildren. In 1894, Michigan brothers John Harvey Kellogg and Will Keith Kellogg introduced Americans to a wholesome, high-fiber breakfast food that required no *mea sur ing*, stirring, and cooking. They manufactured ready-to-eat cereal by baking thin layers of wheat paste into flakes.

The heyday of cold cereals produced the corn flake, which vegetarian food faddist John Harvey Kellogg patented in Battle Creek, Michigan, in 1895. In 1906, the boom in breakfast cereals brought fame to the Kellogg factories, which shipped 1,000 cases of bran, corn, and wheat flakes a day. In 1908, Charles William Post contributed Post Toasties, the beginning of a convenience food empire. By 1911, consumers could select from 107 brands of corn flakes.

Industrialization reinvented cereal grains as fun foods. In 1941, General Mills’s invention of Cheerios turned the amorphous oat cereal into a crisp, miniature doughnut, a shape invented in Pennsylvania Dutch kitchens. The burgeoning market in sugar after World War II turned shredded wheat and corn flakes into sweet snacks. Cereal companies also added small plastic toys and mascot figures to cereal box contents to entice child purchasers.

Television ads of the 1950s and 1960s connected dry cereals with friendly cartoon characters. Children identified breakfast cereals with the Trix rabbit, Cap’n Crunch, Tony the Tiger, Count Chocula, and Lucky the Leprechaun,

spokesman for Lucky Charms. Endorsements from TV cowboy Hopalong Cassidy and puppet Howdy Doody increased cereal consumption of Post Raisin Bran and Kellogg's Rice Krispies. Health-conscious parents compromised on empty calories by topping General Mills's Cocoa Puffs and Kellogg's Sugar Smacks with bananas, raisins, and berries.

In 1970, after agronomist Norman Borlaug's genetic engineering of Asian grains, cereal crops increased yield by 10 percent, augmenting basic nutrition. Meanwhile, American cereal companies trivialized grain nutrition with harmful additives. The dyeing of grain cereal into Froot Loops, Franken Berries, and Boo-Berries intrigued children with Crayola colors. In the 1970s, pediatrician Ben Feingold of California identified artificial hues and flavors as causes of inattention and hyperactivity in young patients.

A health backlash popularized breakfast cereals enriched with niacin, riboflavin, and thiamine. In 1971, the U.S. Food and Drug Administration recommended the addition of iron to breakfast cereals and infant pablum. Invalids reinforced their intake with Carnation Instant Breakfast and power bars, a packable cereal snack for eating with midmorning coffee. Heartier breakfasts buttressed nutrition with fruit smoothies served with granola or muesli, a European cereal composed of walnuts, dried apricots and raisins, and oats.

Under the Child Nutrition Act, in 1972, the U.S. Department of Agriculture established the Women, Infants, and Children (WIC) Program, which distributed iron-fortified baby food and cereal to some 88,000 applicants. In 1975, the federal School Lunch Program promoted preschool breakfasts of dry cereal with milk. The program subsidized free or reduced-priced morning meals to improve nutrition for the poor, especially parturient teens, and to establish a model of wise breakfast selections.

In 1979, a U.S. Department of Agriculture initiative targeted food processors with a chart of popular cereals and the proportion of grain to sugar. Leading the sweets marketers, Kellogg overloaded Sugar Smacks with 56 percent sugar, as contrasted to Quaker puffed rice, which contained 0.1 percent sucrose. The appeal to children was obvious in merry product names—Sugar Crisp, Froot Loops, Alpha Bits, and Lucky Charms, all made up of more than one-third sugar. Although American cereals bore the brunt of criticism, British cooks traditionally sprinkled cereal with Barbados sugar, an additive that increased tooth loss.

Cereal and World Hunger

Cereal suits the human and situational needs of emergency food systems. The independence movement in sub-Saharan Africa in the early 1960s buoyed population so rapidly that the continent shifted from a cereal exporter to an importer in just four decades. The light cargo weight enabled rescuers to airlift sustenance to areas plagued by disease, flood, revolt, and starvation. Global food aid, much of it in the form of cereals, exceeded 10 million tons in some years during the early 2000s, though annual totals varied significantly.

Recent crises in Africa have required greater commitment to halting child mortality and relieving early childhood kwashiorkor and marasmus, which stunt physical growth and mental acuity. In 2010, the International Fund for Agricultural Development loaned Sudanese farmers cash for seeds and cereal for immediate famine relief. Growers repaid the loans with cereal from subsequent harvests. As the underclass raises itself out of calamity, positive indicators in Benin, Burkina Faso, Ghana, Mali, Mauritania, and Nigeria anticipate rapid increases in the cultivation of cereals. Similar programs relieve poverty in Guatemala and Haiti with cheaper cereals and sustainable grains.

See also: Baby Food and Infant Feeding; Breakfast; Corn and Maize; Einkorn Wheat; Emmer Wheat; Fertile Crescent Diet and Food Trade; Pan-European Diet and Cuisine; Rice.

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Charlemagne (ca. 742-814)

The king of the Franks and Lombards, Charlemagne, or Charles the Great, enlarged an empire over central and Western Europe and influenced the ample tables and jovial feasting of his era. His conquests incorporated numerous cultures, including those of Spain and Italy, where Pope Leo III crowned him first emperor of the Holy Roman Empire on Christmas Day 800. By shielding the papacy and crushing Saxon paganism, the king parlayed power far beyond his inheritance. Historians admire his reverence for monastic values and regard him as the father of Europe.

The king kept close watch on his assets and managed the food economy of his people. In addition to reforming currency, he superintended food pricing and, in 794, standardized weights and measures. For soldiers in the field, he organized supply trains to last for several weeks without restocking. His officers followed an orderly system of foraging and convoying. He admired a soldier who chewed meat from the bone and sucked out the marrow, evidence of vigor and avoidance of waste.

In 796, out of concern for pilgrims to Rome, Charlemagne funded food banks and the Schola Francorum, a hospice where travelers could seek meals and medicines. The schools he founded for youths stressed comportment as well as scholarship. He set an example of learning by listening to a lector at dinner read from the Bible and classic authors Augustine and Suetonius.

In his directive *Capitulare de Villis* (*The Supervision of Manors*, ca. 800), Charlemagne ordered cleanliness in the preparation of butter and cheese and in the milling of flour. He accorded honor to bakers as provisioners of the people. His standards affected the collection of honey and nuts and the malting of beer. The directive extended from vinegar and wine to the preparation of lard, mustard, and wax, of which he collected two-thirds for royal use. Out of parsimony, he instructed his poulterers to keep 100 chickens and 30 geese and to sell surplus eggs.

Charlemagne built the reputation of Carolingian kitchen largesse. For his entourage at Aachen, he maintained huge pantries of staples and wine and imported from peasant farms fresh beans and chickpeas. To ensure plenty, he ordered the keeping of the *Inventaire des Domaines* (*Domestic Inventory*, 810), an

ongoing accounting of goods and livestock on royal estates. His penchant for observing the behavior of servants and lords enforced strict house rules of propriety and table manners.

Charlemagne dignified table customs as evidence of a civilized society. A handsome, stately ruler in gold diadem, he dressed in royal gems and embroidered cloaks for feasts, where he presided. According to Einhard, author of *Vita Karoli (The Life of Charlemagne, ca. 817)*, the king preferred Frankish dishes—spit-roasted game accompanied by four side dishes. A follower of St. Benedict, the model of medieval hospitality, the king tended to concentrate on hearty food, especially roast boar and venison. He despised drunkenness and quelled medieval tendencies to eat and drink in excess. He also encouraged adventure stories from his table guests and enlivened the atmosphere with dancers, instrumentalists, and singers. Each of his four weddings coincided with lengthy festivals.

In his last month, chest pain forced Charlemagne to forgo eating. After his death from pleurisy in his early 70s in 814, monks illuminated manuscripts with images of the great host. Appropriately, after antipope Pascal III canonized him as Sanctus Karolus at Aix-la-Chapelle in 1165, Charlemagne acquired his own feast day, July 27, to honor his battles against Saracens and heathenism.

See also: Cider; Dairy Food; Mustard.

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[Cheese](#)

The details of cheese history remain lost in time, but the relevance of dairy food to the cuisine of Europe, the Middle East, and North America is invaluable. The coagulation of high-protein curds derives from a variety of milk—from the Arabian camel, African boar, Ceylonese zebu, Cretan sheep, Greek goats and cows, Italian water buffalo, North American white-tailed deer, Peruvian llama, Russian ass and mare, Scandinavian reindeer, Tibetan yak, and Tunisian camel. Archaeologists assume that storing fresh milk in a goat intestine or cow's stomach may have introduced enzymes that separated curds from the acidic whey.

As long ago as 9000 B.C.E., dried curds suited travelers as a portable dairy food less vulnerable to spoilage than milk or yogurt. Among the Bai of Yunnan Province, in southern China, pastoralists turned coagulated milk into a sheet or string cheese called *rushan*. Tibetans learned the process from the Bai and introduced a buttermilk cheese squeezed into leathery noodles for drying and tying in pretzel shapes or stringing on yak hair.

In the Chihuahua Desert on the Texas-Mexico border around 7500 B.C.E., Paleo-Indian farmers abandoned nomadism and consumed quantities of domesticated cheese and milk along with grain and meat. After 5200 B.C.E., Sumerian animal husbandry in the Tigris and Euphrates delta yielded secondary products from cattle, which added 5 quarts (4.7 liters) of butter and 7.5 quarts (7.1 liters) of cheese per cow to income. Families stored tart feta goat cheese in tall jars. In the Indus Valley, farmers enhanced their diet with butter and cheese from their herds, two sources of interregional trade.

In Asia in 4000 B.C.E., the Chinese tamed the water buffalo, a source of mozzarella cheese and curd. Cuisine relied on cheese, fish, and grain as staples. Chinese cheese makers removed oil from butter and processed the remaining buttermilk into a low-fat commodity that remained edible on the shelf. Worshippers carried altar gifts of butter oil and cheese blended with dates, grain, spice, and wine.

From goats and sheep in the south and cows in the north, the Greeks made cheese to extend the profitability of dairying. In the *Odyssey* (ca. 750 B.C.E.), Homer described the cyclops Polyphemus curdling goat's and sheep's milk with rennet and gathering the curds of *cynthos*, a forerunner of feta, in wicker baskets, which strained and shaped the solids. The grazing of flocks on *cytissus* (Scotch

broom) gave the crumbly cheese its unique flavor and creamy texture. Pastoralists established a steady trade with the Romans, who found innovative ways of incorporating cynthos into cooking.



A cheese maker plunges his arm into a cauldron of curds while making blue cheese. As in the case of other hard cheeses, the curds must then be drained, cut into smaller pieces, scalded, and set in round moulds for ripening. (Steven Senne/Associated Press)

On Crete, shepherds kept busy daily curdling the output from sheep, which they milked twice a day. Farmers used tree roots, oak splits, and pear wood to make stirring sticks and whisks for whipping boiling milk into coagulation from the action of lamb's rennet. Lumps of solids hardened in a second boiling. Air-dried on wooden frames for 30 days, the wheels of sheep's milk cheese, called *mizithra*, ripened in mountain dugouts accessed by low tunnels. Traders loaded rounds into goatskin sacks for shipping and for selling locally. Islanders ate *mizithra* in pies or with honey or olives. The physician Hippocrates validated it and other Mediterranean cheeses for their nourishment and ease of digestion.

From the Etruscans, the Romans learned to curdle milk with vegetable enzymes from artichokes, cardoons, figs, safflower seeds, and thistles. Around 70 B.C.E., the scholar Varro stated that Roman dairiers advanced from kid and lamb enzymes to hare and goat rennet. Using complex methods of ripening solids, commercial dairies pressed and aged cheese for export. Fresh or soft ricotta

cheese required air-drying and salting. After a soaking in cold water, workers shaped soft-paste mozzarella into rounds for immediate use.

Columella's agrarian encyclopedia *De Re Rustica* (*On Agriculture*, ca. 50 C.E.) detailed a longer dehydration or smoking of cheese over apple wood or straw followed by scalding with boiling water and hand shaping in wooden frames. The stored curd yielded hard cheese, which cooks flavored with pepper, pine nuts, and thyme. As described by encyclopedist Pliny the Elder's 37-book *Historia Naturae* (*Natural History*, ca. 77 C.E.), the cheese industry flourished at the beginning of the Roman Empire and contributed to cosmopolitan trade around the Mediterranean. The best Greek cheese came from Ceos and colonies in Sicily; the Romans ranked at the top Alpine, Apennine, and Vestinian cheeses from the Abruzzi hills and the worst from Gaul, where smoking overcame the natural sweetness.

Artisanal Cheese

Soft cheese achieved popularity for its fresh taste and low price. As a breakfast dish, ordinary Romans consumed it with bread and olives or vegetables. Wealthy consumers bought interesting dairy products from northwestern Europe an sites, where bacteria and mold imparted unusual flavors. A favorite, semihard emmental, came from Helvetia; in Auvergne, France, mountain herders made cantal by pressing curds in a wooden cylinder called a formage, source of the French *fromage* (cheese). Gourmands reserved hard cheese, such as Bithynian varieties, as a dinner finger food or dessert nibble served with wine. Grated cheese topped gratins and contributed to the taste of bread, cakes, dips, and wine drinks.

Medieval cheese making, based on Roman methods adopted in river valleys, ensured supplies of Gorgonzola, Grana, Gruyère, provolone, and Roquefort as year-round pantry staples. Among Byzantine herders, halloumi, a Cypriot and Egyptian cheese, mixed goat's and sheep's milk flavors and remained fresh from a coating of mint leaves and storage in brine. Paneer, imported from India, derived from a curdling process that added lemon juice to milk. The coagulation satisfied the vegetarian needs of Hindus.

In the late 700s, Moorish herders brought goat cheese making to Poitou, France. Along Italy's Po River in the eleventh century, Benedictine and Cistercian monks preserved local cheeses as a gesture of hospitality to guests and patients at monastery clinics. The brushing of washed-rind cheese with beer, brandy, brine, or saltwater encouraged bacteria to produce mold, the type of crust and veining that distinguish Brie and Limburger. In northern Scotland, highland dairies employed stones in a metal frame to press whey from solids to make caboc cheese, which they sealed in oatmeal. A peasant favorite, crowdie, which coated the stomachs of whiskey drinkers, bore a coating of black pepper.

The end of the Dark Ages in 1000 derived from a livelier agricultural trade. From 1170, royal provisioners of Henry II bought tons of cheddar from Somerset, where dairies chopped and matured curds in humid caves for over a year. A century later, north-central Italians thrived on the sale of Parmigiano-Reggiano, a crumbly dairy food popular for grating into rice and soup and over pasta. At Lodi, farmers made shortaged mascarpone, a dessert cheese, from cream clotted with lemon juice. For Balkan, North African, and Turkish cuisine, feta and Kasar filled borek, a stuffed pastry encased in phyllo dough and deep-fried.

To the north, the Dutch made a similar success of Edam and Gouda. From the 1300s, sailing crews and home diners enjoyed Edam with melons and pome fruit. Gouda, coagulated with muriatic acid, had a pungent flavor that barkeeps served with ale. During the age of voyages, provisioners stored cheese in ships' galleys. After 1608, Samuel de Champlain introduced Canadienne cheese at Quebec, where dairies followed French techniques. The Pilgrims stocked the *Mayflower* with Holland cheese and, in 1620, brought northern European dairy skills to the Massachusetts Colony. In 1791, Marie Harel, a Norman farmer, sold the first Camembert, a creamy spread made from cow's milk in a style perfected by farmers from Brie.

Following the defaming of cheese in the late Renaissance as harmful to health, dairy foods revived in commercial importance during the 1800s. The Swiss introduced manufactured cheese in 1815; Norwegians followed industrial trends in the 1850s with the production of nutty, sweet Jarlsberg. Commercial production of uniform cheeses in the United States began in Rome, New York, in 1851, when grazier Jesse Williams built the nation's first factory distributing boxed cheeses. By 1859, John J. Smith, owner of Wisconsin's first cheese vat,

opened a plant in Sheboygan County. From the late 1860s, cheese processors inoculated batches with scientific microbial culture rather than the lactobacilli, lactococci, and streptococci ambient in nature.

As former colonies developed indigenous styles of food production, cheese took on regional flavors. In Sydney, Australia, the production of creamy *buche noir* concluded with the dusting of wheels of goat's milk curds with the ashes of a vine. In 1881, Canadian dairier Édouard-André Barnard taught coagulation methods in Quebec at North America's first cheese-making school. The initial commercial successes, Camembert and feta, preceded a lengthy history of experimentation and innovation in the use of herding products, which established Quebec as Canada's center of cheese excellence.

Production Today

Presently, world cheese consumption reaches 30 grams (1 ounce) per day among the British and 65 grams (2.3 ounces) for the Austrian, Danish, Dutch, French, German, Greek, Italian, Swedish, and Swiss diner. In twelfth place, American consumers eat cheese as often as diners in Finland, Iceland, and Norway. U.S. dairies allot one-third of their milk to the manufacture of 300 varieties of cheese.

To control the texture and melt, processors emulsify cheese with salt and add dyes, milk solids, and preservatives. Manufacturers market the results unsliced, sliced, shredded, or grated, or in aerosol cans, cheese mills, dips, and spreads. The popularity of pizza and string cheese boosts mozzarella to the top seller, followed closely by cheddar, the main ingredient in grilled cheese sandwiches and macaroni and cheese.

The local food and Slow Food movements augment demand for Asiago, Gorgonzola, and Havarti as well as chèvre and Muenster. The Ark of Taste, a catalog of heritage foods, honors sustainable cheeses for their contributions to regional cuisines, such as Abruzzi pecorino, American kunik, Austrian abgereifter, Brazilian sack cheese, British Dorset blue, Calabrian caprino, French rove brousse, Dutch leiden, Icelandic skyr, and Polish oscypek.

See also: Animal Husbandry; Charlemagne; Dairy Food; Fermented Foods; Travel Food.

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Chicle and Chewing Gum

A pungent natural latex grown from Brazil and Colombia north to Yucatán in Mexico and the Orinoco River valley of Venezuela and in the Philippines, chicle is the central ingredient of chewing gum. A familiar milky resin to the Maya from the sapodilla tree (*Manilkara chicle* or *zapota*) from 3000 B.C.E., chicle served as a thirst quencher as well as waterproofing, glue, mortar, and incense. From January to July, the inner bark of each tree dripped between 3 and 4 pounds (1.4 and 1.8 kilograms) of sap from v-or z-shaped slashes in the trunk. Trees remained productive for more than 15 years.

After Aztec collectors boiled away the 29 percent of liquid in vats, they produced a chewable mass and shaped it into bricks. For each mouthful of chewing gum, users mixed the chicle resin with wax and *Llaveia axin*, a greasy yellow insect larva. Along with improving digestion through the flow of saliva, the gum freshened breath and cleansed the mouth. Much as New England Indians shared spruce gum and pinesap with the Pilgrims, the Aztec offered chicle gum to Spanish conquerors arriving in Mexico City. Homemade recipes for the resin gained popularity as a confection with Europeans.

According to sixteenth-century Spanish ethnographer Bernardino de Sahagún,

author of the *Florentine Codex*, the public chewing of gum by women and homosexuals bore a flirtatious connotation. For wives and widows, public chewing earned social disapproval. Still, a ban on gum chewing by the Catholic archdiocese failed to exterminate the habit.

Marketing

In the nineteenth century, General Antonio López de Santa Anna claimed to pay his Mexican army with the proceeds of chicle. After he introduced chicle chewing in New York City, foreign interests stole gum production from the Mexican *chicleros*. The commercialization of chicle replaced the chewing of spruce gum, America's first commodity gum.

An Ohio dentist, William F. Semple, patented a method of dissolving chicle in naphtha and alcohol in 1869. After drying the jellied mass for a week, he added chalk and flavored the gum with licorice root or oil of wintergreen and sugar. The process concluded with a coating of sweetened beeswax. He intended that his patients chew gum as a means of strengthening the jaws and scrubbing their teeth.

On Staten Island, glass merchant Thomas Adams, the first chewing gum millionaire, sold "Adams New York No. 1" in drugstores for a penny a stick for "snapping and stretching." He entered the flavored gum market in 1870 with Black Jack Gum, a licorice mouth and throat soother that sweetened smokers' breath. His company employed the first gum assembly line in the country and made gum one of America's first mass-produced processed foods.

Other manufacturers sweetened chicle with corn syrup and coated it in powdered sugar, which Canadian industrialist William John White of Ontario, the second chewing gum millionaire, added to his Yucatan brand in 1880. By 1888, gum chewers could buy Tutti-Frutti from vending machines in the New York City subway. Edwin E. Beeman, a physician from Cleveland, Ohio, added pepsin in 1891 to turn recreational gum into a digestive aid. By 1897, the United States placed a tariff of \$300 per ton on crude chicle.

In 1899, the American Chicle Company formed a binational monopoly from a merger of the trademarks of Adams, Beeman, and White plus companies in

Baltimore; Chicago; Cleveland and Dayton, Ohio; Louisville, Kentucky; Newark, New Jersey; Philadelphia; Portland, Maine; Rochester, New York; St. Louis; and Toronto, Canada. New York City pharmacist Franklin V. Canning added a hygienic cavity preventer in 1899 with the creation of Dentyne.

William Wrigley of Chicago added fruit flavor and mint to rectangles of gum he called Chiclets. His voice for tariff relief urged Congress to reduce import duties on raw chicle. His products generated so much income that, in the early 1900s, sapodilla growing increased migration to Yucatán. In northern Belize, farmers planted some 23 sapodilla trees per acre (about 57 per hectare).

In 1906, Cadbury Adams marketed Chiclets, a candy-coated chewing gum available in peppermint and bright colors. The pellets sold well in fruit flavors throughout North America and Egypt as well as Belgium, Brazil, China, the Dominican Republic, Germany, Greece, Haiti, India, Iran, Italy, Japan, Peru, Portugal, Spain, and Turkey. Confectioner Frank Henry Fleer competed with fruit-flavored Dubble Bubble, which he sold with baseball trading cards.

Innovations

Before World War I, the U.S. military added chewing gum to boxed meals as a stress reliever and hygienic mouth cleaner for soldiers in the field. Although doctors warned that chomping permanently skewed the face, Americans in 1914 chewed 1.5 billion sticks of gum. Adams & Sons continued expanding that year with sour gums and the introduction of Clove, a spiced gum that became popular during the Prohibition era as a cover for alcohol on the breath. By 1924, Mexico earned \$2 million from annual chicle exports to Britain, France, and the United States.

Gum reached market shelves as glazed sticks, ribbons, gumballs and jawbreakers, kosher gum, cubes, powder, extrusions, and pellets with liquid centers. Medicated gum delivered stamina-boosting caffeine and ginseng as well as green tea and *guarana*, an energy and memory aid valued by the Guaraní and Tupi of Paraguay.

U.S. GIs spread the fad to Western Europe in the 1940s—the golden age of chewing gum—when British kids yelled, “Hey, Joe! You got gum?” at passing

Allied soldiers. Because of war time sugar rationing, the Wrigley sugarless Orbit brand featured a natural sweetener devoid of sucrose in such exotic flavors as mango and watermelon. A decade later, Wrigley replaced natural resins with a petroleum-based synthetic rubber made from a butadiene polymer, which it distributed in the United States, Canada, and England under the logos Doublemint, Juicy Fruit, and Spearmint.

The U.S. Food and Drug Administration inveighed against the gum industry in 1970 with a ban on cyclamate sweetener. In 1975, Wrigley invented cinnamon-flavored Big Red and Freedent, a brand that doesn't adhere to dentures.

Mexican chicleros returned to the business of chicle gum making in 1995 and produced Chicza, an organic brand available in Great Britain. In 2010, Peppermint brand reintroduced minted chicle gum in Great Britain and Holland. The makers based their formula on carnauba wax, rapeseed lecithin, gum arabic, and chicle from the Central American rain forest. Sweetening it with xylitol (wood sugar), they claimed, remineralized damaged tooth enamel.

See also: Cortés, Hernán de; New World Commodities.

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[Child, Julia \(1912-2004\)](#)

A major influence on modern American cookery and cuisine, Julia Carolyn

McWilliams Child infused uninitiated homemakers with vigor and daring through her television demonstrations and cookbooks.

Born the eldest of three on August 15, 1912, in Pasadena, California, to Julia Carolyn Weston and agronomist John McWilliams, Child attended a private boarding school and completed a degree in English at Smith College. After a stint in home furnishings advertising for W. & J. Sloane in New York City, she joined the Office of Strategic Services (OSS) in Washington, D.C., as a research assistant and traveled in Asia during World War II.

Intelligence work introduced Child to international haute cuisine in a variety of venues in China, Sri Lanka, and Europe. With her husband, cartographer and gourmand Paul Cushing Child, she sampled food in Marseilles, Paris, and Provence, a 1949 cultural odyssey summarized in her posthumous autobiography *My Life in France* (2006).

The couple settled in Paris, where she became a disciple of Georges Auguste Escoffier, the “Father of Modern French Cuisine.” In 1949, she took classes at the Cordon Bleu, the revered Parisian cooking school, studied privately under Belgian chef Max Bugnard, and joined a gastronomy club, the Cercle des Gourmettes. With Simone Beck and Louisette Bertholle, she opened a cooking school in her apartment on the Left Bank.



California-born chef, cookbook author, and television personality Julia Child introduced and adapted French cuisine to the American mainstream. Her enthusiasm and forgiving approach in the kitchen raised interest in fine cooking and dining. (Bachrach/Getty Images)

In her 30s at the family country house in Cambridge, Massachusetts, Child perfected her skills, from swinging a meat cleaver to melting cheese with a blowtorch. With her colleagues, Beck and Bertholle, she compiled a gastronomic classic, *Mastering the Art of French Cooking* (1961), and freelanced columns on artisanal kitchen skills for the *Boston Globe*, *House and Garden*, *House Beautiful*, *McCall's*, and *Parade*. Her maiden appearance on educational television for WGBH in Boston on February 11, 1963, launched an award-winning ten-year series, *The French Chef*, the first television program captioned for the deaf.

An upbeat, self-assured food master, Child gave credibility to the love of good food into the 1990s. She displayed the chef's knife and whisk, the buttered casserole, and the stockpot, all elements of the standard *batterie de cuisine* (kitchen equipment). She demystified boning chicken, chocolate sculpting, forming gnocchi, lobster boiling, creating phyllo pastry, and making a perfect meringue. Customer demand for implements and ingredients increased the business of kitchen boutiques and fine-foods stores.

Child's lectures, televised program *Dinner at Julia's*, and books—*The French Chef Cookbook* (1968), *From Julia Child's Kitchen* (1975), *Julia Child & Company* (1978), and *The Way to Cook* (1989)—generated enthusiasm for fine dining at home, in restaurants, and in the White House of President Jimmy Carter. In 1981, with gastronomer James Beard and wine expert Robert Mondavi, she cofounded the American Institute of Wine and Food, a league of restaurants, to promote glamorous meals of fresh ingredients and table camaraderie. From the consortium came two publications, *American Wine and Food* and *The Journal of Gastronomy*, as well as the Julia Child Award.

In her 80s, Child broadcast three of her programs from her home kitchen, which Paul Child designed to accommodate cameras and set lighting. In a cover article, *Time* magazine dubbed her “Our Lady of the Ladle.” She approved nouvelle cuisine and the local food movement but avoided the extremes of exotic food clubs, health obsessions, and veganism. She scoffed at dieting, temperance, organic foods, and free-range poultry and crusaded for the enjoyment of cooking and eating. In collaboration with Jacques Pepin on a subsequent television series, she retained her humor while educating viewers on international dishes.

In 2000, after years of conducting culinary tours of France, she was named chevalier of the Legion of Honor by the French government and elected as a fellow of the American Academy of Arts and Sciences. The following year, she appeared in Napa, California, at the unveiling of the American Center for Wine, Food, and the Arts, a 17-acre (7-hectare) culinary tutorial center. In 2003, she accepted the U.S. Presidential Medal of Freedom. The fervor of fans inspired a biopic, *Julie & Julia* (2009), a tribute to Child's culinary gusto.

See also: Beard, James; Film, Food in.

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Chili

A satisfying comfort dish and fast food, chili con carne combines beef with chili peppers, fat, and herbs to create a fiery one-pot meal. A product of the Great Basin of North America, chili dates to Papago, Pueblo, and Ute dishes made from fresh horse or venison, cornmeal, and peppers. As revealed in army surgeon Stephen Compton Smith's *Chile con Carne; or the Camp and the Field* (1857), chili con carne nourished waves of westerers. American pioneers devised a convenient trail staple by pounding chili peppers, salt, and suet into beef jerky. The resulting blocks, called "chili bricks," traveled well and blossomed with flavor when rehydrated in boiling water and served with crackers and buttermilk.

In the mid-1800s, the devilishly hot stew fed travelers in depot cafés and on college campuses. Drivers and wranglers ate from the backs of chuck wagons, where camp "cookies" invigorated batches with onions, oregano, and smoky wild chilipiquíns (bird peppers). The washerwomen who served Texas militias braced goat stew with chili pepper and wild marjoram. For bulk, prison and ranch cooks added black beans, black-eyed peas, cracker meal, great northern beans, kitchen beans, *masa harina* (corn flour), and navy or pink beans. In 1890, food processor DeWitt Clinton Pendery simplified chili making by hawking his Chiltomaline chili powder, which he claimed aided digestion and fostered appetite and health.

Texas State Dish

The Texas frontier developed a reputation as a chili haven. Cooks delivered fresh batches daily by pushcart. By 1889, Oklahoma offered chili at lunch counters. Priests, fearing that the popular dish would inflame sexual appetites, preached chili abstinence. A San Antonio vendor introduced the stout stew to urbanites in Chicago at the 1893 Columbian Exposition, where programs referred to the dish as a "hash of meat and spices." British journalists, lacking a comparative to explain chili, called it "curry meat."

At Military Plaza Mercado between San Antonio's city hall and San Fernando Cathedral, from the 1880s, Latino women cooked pots of chili redolent with cayenne pepper and chili powder to sell to pedestrians. Known as "chili queens,"

the women turned their kitchen business into a unique fast food. They reheated pots of chili over charcoal and mesquite fires and, for a dime, served bowls of beans and chili and a tortilla to soldiers, tourists, and trail hands. The street earned the name La Plaza del Chile con Carne.

After the queens moved operations four blocks west to Haymarket Plaza, people of all classes ate together under colored lantern light to the music of mariachi bands. The egalitarian eateries flourished for a half century until September 12, 1937, when the city health department closed the open-air venue because of flies and unsanitary dish washing. San Antonio's chili market survived in author Stephen Crane's sketch "Stephen Crane in Texas" (1889) and O. Henry's "Seats of the Haughty" in *Heart of the West* (1904) and in the café business of Esperanza García, Juanita García, and Eufemia López.

[Recipe: Texas-Style Chile con Carne](#)

In a Dutch oven, brown 3 pounds of coarsely chopped lean beef shoulder, round steak, or ground buffalo meat in 2 tablespoons of lard or 2 ounces of beef kidney suet. Add two large chopped red onions and stir the mixture over medium-high heat. Complete the recipe with 1/2 cup of chopped ancho, red, or serrano peppers; 1/2 teaspoon of dried basil; 1 teaspoon each of paprika and Tabasco; 1 tablespoon each of cumin and oregano or marjoram; one can of tomato paste; two bay leaves; 2 cups of red wine vinegar; and 1 cup of water. Season with black pepper and coarse sea salt. Simmer on low for three hours. Chill overnight before skimming off the hardened fat. Reheat and serve with saltines or oyster crackers and a choice of chopped green onions, lime wedges, pickled jalapeños, shredded sharp cheddar cheese, and sour cream.

Industrialized Fare

Chili ingredients migrated from the Southwest throughout the globe. In 1896, Willie Gebhardt, a German immigrant and owner of the Phoenix Cafe in New

Braunfels, Texas, imported ancho chilies from Mexico and ground them with black pepper, cumin, and oregano to bottle for sale as Eagle Brand Chili Powder. In 1908, he canned the first heat-and-eat chili.

Lyman T. Davis dispensed bowls of chili from the back of a wagon on the dirt streets of Corsicana, Texas. He distributed his stew in 1921 under the Wolf Brand Chili label. Promoters of Lyman's Pure Food Products drove a T-model Ford with a body shaped like a tin can. On the back, Davis's pet wolf, Kaiser Bill, rode in a round cage.

Texas families dispatched containers of Wolf Brand Chili to sons in service during World War II. In the field, soldiers reheated their gift food in helmets. To meet postwar demand, Lyman's factory added chili products—hot dog sauce, lean beef chili, and turkey with beans. In 1977, the popularity of Wolf Brand influenced the Texas legislature to drop barbecue and gumbo from the running and to name chili the state dish.

In the Great Depression, throughout the South and Southwest, chili parlors served up bowls of chili, both fresh and canned, with a side of corn bread or saltines. Innovators touted a variety of chili concoctions—chili burritos and omelets, chili cheese fries, chili-topped baked potatoes, corn bread casserole, Frito pie, layered chili salad, nachos, quesadillas, and taco pizza. Chefs originated menu items featuring allspice, beans, fried eggs, hamburgers, hot dogs, jalapeños, melted cheese, onions, sour cream, tomatoes, tortillas, and vinegar.

The Texas State Fair in Dallas enlivened competition in October 1952 by launching the World's Chili Championships. Stern rules limited experimentation with beans, corn or hominy, marinades, pasta, rice, and premixed spices. The contests ended at a specified time, when cooks presented the judges with a sample. Criteria ranged from aroma, consistency, and red color to taste and aftertaste, a common result of four-alarm recipes.

Chili dishes continue to emerge from rearrangements of standard ingredients. A green version, chili verde, begins with pork spiced with green chilies and tomatillos. The U.S. Army offers chili mac (with macaroni) as a Meal, Ready-to-Eat (MRE), a boxed field ration. Vegetarians favor chili made from beans, corn, potatoes, or tofu. Health promoters cook white chili from chicken or turkey breast and white beans. In Australia, Hawaii, and Great Britain, chili fans take their spicy meat over rice.

See also: Cook-Offs; Peppers; Street Food; Tex-Mex Diet and Cuisine.

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Chinese Diet and Cuisine

See Cantonese Diet and Cuisine; Szechuan Diet and Cuisine

Chocolate

A food favorite for more than 3,000 years, chocolate derives from the cacao tree (*Theobroma cacao*), which originated in South America around 2000 B.C.E. By 1200 B.C.E., the Mexica of Chiapas and northern Hondurans were eating chocolate in both liquid and solid forms. Aborigines along the Amazon and Orinoco rivers cultivated the trees from 1100 B.C.E. and stored pods in ceramic vessels.

Among the Maya, the Nahuatl word *xocolatl* (bitter water) described the acrid taste that required fermentation to make it edible. The chemical conversion of carbohydrates into acids or alcohols transformed the tree pods into the first edible chocolate. Because Mesoamericans lacked cane sugar and milk, their chocolate tasted more like a vegetable than a sweet. After 1000 B.C.E., the Ol-mec cultivated cacao in Tabasco and Veracruz, Mexico. By 100 C.E., cacao beans received Mayan reverence as aphrodisiacs, currency, emblems of godhood, and a

source of cooking sauces. Healers recommended bitter cocoa as a cure for cough, fever, and morning sickness. By 600, Mayans cultivated cacao trees at plantations throughout Yucatán. Trade to the north around 900 introduced the drink to Pueblo Indians of the Great Basin, the first major cacao importers.

In stone mortars, the Maya ground beans of the Criollo cacao tree into a fragrant paste to mix with chili, cornmeal, blossoms, and honey and make a thick chocolate drink sipped by royal courtiers. Worshippers dyed the drink red with achiote and presented the beverage as a ceremonial altar gift. In Guatemala, the Aztec filled bags with cacao beans to serve as coins. Rich Mesoamericans secured chocolate rounds in screw-top jars. Temple architecture featured carvings of cacao pods as the food of the agricultural god Quetzalcoatl.

Chocolate also figures in the *Codex Zouche-Nuttall* (1051) drawn on deer hide in the depiction of a bride offering chocolate to a pre-Columbian Mixtec ruler at Oaxaca. A scene in the late-sixteenth-century *Codex Tudela* demonstrates how Aztec servers generated foam on ritual pots of chocolate. Historians compared the precious drink to the Christian Eucharist and to agricultural tribute levied against conquered tribes. The accumulation of chocolate elevated the Aztec in power and authority.

From New World to Old

On November 7, 1504, Christopher Columbus completed a voyage to Nicaragua and returned to Spain with the first brown cacao beans seen in Europe. His discovery received little attention but eventually altered culinary tastes and cooking styles. On November 8, 1519, Hernán de Cortés's forces reached Mexico and observed chocolate consumption. Throughout the day, Aztec Emperor Montezuma II drank honeyed hot chocolate fragrant with vanilla. According to eyewitness Bernal Díaz, court servants stored the drink in thousands of jars and served it to businessmen, nobles, priests, and war heroes. The imperial court declared chocolate too intense an aphrodisiac for priests or women to taste.

In 1528, the conquistadors carried three chests of chocolate, chilies, and vanilla from Tenochtitlán back to King Charles V, along with the tools to stir the hot drink. The Spaniards accepted from Aztec servants cups of frothy hot chocolate

spiced with chilies and the sultry aroma of vanilla. Cortés disliked the taste but realized the monetary value of the cacao bean, which he grew on a plantation in Cuernavaca after 1535.

The Spanish delegated secret chocolate making to Dominican monks, who revamped the Aztec recipe by adding allspice, cinnamon, cloves, nutmeg, sugar, and vanilla for a unique European taste. By 1585, the cacao bean became an international trade commodity, traveling by ship from Veracruz to Seville. As food and medicine, chocolate rose in value over the next two centuries in Austria, France, Germany, and Iberia as well as in the American colonies, Brazil, and the Philippines.

At Versailles, France's Louis XIV promoted the idea of chocolate as the food of seduction. Because of French, English, and Belgian fervor for the trendy drink, governments viewed cacao as a source of new luxury taxes. As seventeenth-century chocolate houses opened throughout major European cities, the Spanish lost control of the cacao monopoly.

In 1707, Irish physician and archivist Hans Sloane introduced milk drinkers to chocolate milk, which he promoted in England and Jamaica for nourishment and well-being. Physicians treated dysentery, inflammation, kidney stones, and tuberculosis with chocolate. Boston apothecaries sold chocolate imported from Europe. In 1741, to strengthen Swedish women, naturalist Carolus Linnaeus promoted the mix of ground cocoa, ambergris, cinnamon, sugar, and vanilla sold in drugstores. Viennese confectioners selected contrasting dark and white chocolate to mold candies called the nipples of Venus.

The Craze

By 1800, factories in Germany, Spain, and Switzerland had industrialized chocolate confections, thereby increasing the profitability of New World cacao plantations. The hydraulic cacao press, invented at Amsterdam in 1828 by Dutch chemist Conraad Johannes Van Houton, powered the "dutching" process, squeezing out acidity and bitterness in cocoa butter to smooth chocolate drinks into a pleasing consistency. The process fermented, cleaned, and dried cacao beans and roasted and winnowed the pods. Ground into cocoa cakes and cocoa

liquor, the final product of cocoa butter and cocoa powder resulted from milling. The extrusion method reduced the cost and increased the popularity of chocolate at all socioeconomic levels. In 1851, U.S. fanciers admired chocolate bonbons and creams, manufactured by Quaker entrepreneur John Cadbury and featured at the London Exposition.

In the twentieth century, Quaker chocolatiers championed the beverage in the United States as a replacement for alcoholic drinks. In grocery stores, cooks found stocks of cocoa powder and baking chocolate mass-produced in Pennsylvania by the Milton Hershey Company, an international chocolatier on a par with Cadbury, Ghirardelli, Godiva, Lindt, Mars, and Nestlé. From the early 1900s, the homemaker could select baking chocolate and vanilla for delivery by mail from the Sears catalog. A flurry of candy bar manufacturing in the 1920s put some 40,000 brands on the market.

Distribution slowed during World War I and again in the late 1930s at the approach of World War II. In September 1939, the German bureaucracy denied civilians butter, chocolates, and whipped cream. In England, in lieu of rationed tea, older children received fruit and chocolate as nutrients. During U.S. airlifts along the Burma Road into China in April 1942, C rations arrived in tins containing a reassuring snack of chocolate, biscuits, instant coffee, and sugar cubes.



Venezuelan plantation workers break open cacao pods to retrieve valuable Porcelana beans inside, used to make high-quality chocolate. The beans are then dried, roasted, milled, liquefied, and processed for final color, variety, and sweetness. (*Sipa/ Associated Press*)

After World War II, veterans returned home with a yen for chocolate. Culinary schools and articles by essayist M.F.K. Fisher taught kitchen beginners how to hand-dip chocolates, which contained wax to firm up bonbons and cake decorations. In 1947, the Harry & David Company in Medford, Oregon, offered a gift-wrapped Tower of Treats containing chocolate truffles and shortbread. Corporations rewarded clients with Dean & DeLuca foil-wrapped chocolates and nuts in baskets.

Original Tex-Mex recipes incorporated Az-Mex spiced bitter chocolate *moles* (sauces) to complement meat entrées. In place of processed chocolate and sugary sweets, raw foodists flavored raw dark chocolate pie. In the 1950s, gourmet food co-ops experimented with innovative fondue by coating strawberries in chocolate. In the 1970s, food curiosity inspired such ventures as the Chocolate Connoisseur's Club and Popcorn of the Month, which featured white chocolate drizzles. In 1995, Godiva in Brussels, Belgium, added kosher varieties to its gourmet confections.

Before chocolate came to market as candy, drink mixes, icing, or powdered cocoa, New World food processors dyed it brown with caramel concentrate. A paraffin coating on chocolate bars prevented deterioration from bacteria, fungi, and light, even on army D rations and pantry supplies for space missions. For religious holidays, French and Italian confectioners formed chocolates in the shape of fish, a Christian symbol. In Australia, Lamington cube cakes combined cream or jam filling with a topping of chocolate and coconut, an icing also applied to German chocolate cake.

Today, shipments of cacao beans and cocoa powder from Ghana and the Ivory Coast feed the global demand for chocolate. A worldwide endeavor to root out child labor and stem slave trafficking lingers in the Ivory Coast, where exploiters may kidnap for sale some 12,000 underage beggars and orphans from Benin, Burkina Faso, Mali, and Togo. In 2001, the U.S. Congress charged enslavers with tricking and coercing boys and forcing them to carry heavy cacao sacks and machetes during a 100-hour week. The boys received no education. Some

languished in farm prisons and died on the job. Manufacturers gave African overseers until 2005 to eradicate child slavery in the cacao market. By 2008, however, young press gangs still formed part of the labor force that generated 80 percent of the world's cocoa.

As of early 2012, the rest of the world supply of cocoa came primarily from Brazil, Colombia, Dominican Republic, Indonesia, Madagascar, and Venezuela. Many consumers preferred 60–70 percent cocoa for pure dark chocolate, a former luxury that health food advocates promoted as heart healthy and mood enhancing.

See also: Cortés, Hernán de; Currency, Food as; Dairy Food; Gourmet Cuisine; Pan-European Diet and Cuisine; Sloane, Hans.

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Chowder

A broad term for a thickened seafood and vegetables stew, chowder is a filling one-dish meal suited to cold, blustery seashores. Named for the *chaudière*, a three-legged iron cauldron that seafarers heated by the shore for cooking fresh seafood, chowder flourished in fishing communities from ingredients at hand, including herbs and wine. Unlike the more refined pureed bisque soups, the improvisational chowder flourished in the 1500s in Brittany, France, and Cornwall, England, where the boil-up of a successful catch was reason for a community celebration.

Basque and French sailors carried the recipe for a creamy white fish soup to

the Canadian Maritimes, where the native Micmac had their own tradition of fish stew. Acadian clam chowder followed traditional French recipes and came to the table with a sprinkle of dried dulse, a purple seaweed. Nova Scotian chowder employed haddock along with abundant scallops and lobster in fish stew. When explorer Joseph Banks visited Newfoundland in 1766, he described cod chowder as a food reserved for the poor.

Upon arrival among Algonquin Indians at Plymouth in Massachusetts Colony in 1620, the Pilgrims felt so amply supplied with clams that they had no reason to fish for stew meat. In Maine and at Nantucket Island, Channel Islanders reduced chowder to the basics of fish cooked in boiling water thickened with flour. Elsewhere along New England's 5,700-mile (9,200-kilometer) coast, cooks made clam chowder by thickening cream-based clam soup with unsalted hardtack, a rock-hard military biscuit carried on naval vessels. In 1751, the *Boston Evening Post* published a layered chowder recipe in verse form. At Georges Bank, Maine, clam diggers preferred the large, flavorful mahogany clam and the small, soft steamer clam. The larger ocean clams required seagoing dredges for retrieval.

In the 1750s, Italian-born New Yorkers augmented the New England recipe with allspice, clove, Rockaway clams, sage, and tomatoes. The resulting stew, later called Coney Island or Fulton Market clam chowder, paralleled the popularity of the creamier, New England original. Makers of the Long Island version compromised by blending the creamy white sauce with tomatoes and littleneck clams. The small, tender clam derived from Little Neck Bay, where diggers located them at low tide with their bare feet. Open-minded chowder fanciers tended to like both creamy and tomato sauces. Rhode Islanders served both styles but excelled at a clear broth containing bacon, onions, potatoes, and quahogs, a hard-shelled clam that thrived at Narragansett Bay. Portuguese immigrants preferred the tomato-based stew, a recipe that traditional New England chowder aficionados declared anathema.

Regional ingredients localized U.S. chowders. The first American cookbook, Amelia Simmons's *American Cookery* (1796), issued at Hartford, Connecticut, substituted bass for clams. In 1802, Susannah Carter's *The Frugal Housewife* gave less definitive recipes, allowing the cook to choose a cup of beer, sliced lemon, or tomato ketchup as flavorings. According to *A Treatise of Domestic Medicine* (1824), physician Thomas Cooper, an English immigrant to Carlisle,

Pennsylvania, spiked his chowder with anchovy sauce.

Miss Leslie's New Cookery Book (1857), compiled by Eliza Leslie of Philadelphia, departed from the cauldron method of making "Yankee chowder," instead recommending a lidded Dutch oven heaped with embers. At Boston, Elizabeth H. Putnam's 1858 recipe collection, *Mrs. Putnam's Receipt Book and Young House keeper's Assistant*, described a rich finish for chowder consisting of butter, cream, and flour. A Chicago cook reported in 1897 a new twist on thickening with the addition of rice as a binder. Delaware cooks centered their clam chowder on the flavor of fried salt pork. Virginians made the most of cod or cherrystone clams, a medium-sized specimen. Outer Banks restaurants in coastal North Carolina offered a similar blend of tastes, beginning with bacon. Farther inland, the absence of seafood precipitated a recipe for corn chowder, a compromise from Piedmont farmwives.

In St. Augustine, Florida, Minorcan clam chowder featured a hot chili pepper gathered by indentured laborers. Along the Florida Keys, an influx of Bahamians introduced a unique chowder made from conch meat. In

[Recipe: New England Clam Chowder](#)

In a heavy iron stew pot, melt 1 tablespoon of butter and sauté 1 cup each of diced celery and onion and 1/2 cup of diced bacon or pancetta. Add 3 1/2 cups of chopped clams, 2 quarts of clam juice, 2 bay leaves, and 1/2 teaspoon each of chopped summer savory and thyme. Bring to a boil. Melt 1 cup of butter in a skillet and stir in 1 cup of granulated flour to make a roux. Pour the roux into the clam mixture. Add 1 cup of peeled and finely sliced red potatoes and simmer for 20 minutes. Finish with 2 cups of half-and-half (half cream, half whole milk), pepper, and sea salt. Serve with oyster crackers.

San Francisco, cooks ladled New England-style white chowder into hollowed sourdough loaves. Farther north at Portland and Seattle, cooks replaced pork flavoring with smoked salmon or razor clams.

See also: Crackers; Fish and Fishing; North American Diet and Cuisine;

Pennsylvania Dutch Diet and Cuisine; Restaurants; Soups.

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Chutney

A broad category of sweet-and-sour condiments from Southeast Asia, chutney derives from the mix of fresh or pickled fruits or vegetables with chilies, cilantro, mint, and spices. Whether cooked to the texture of jelly, preserves, or chunky salsa, chutney obtains its distinctive bite from fermentation in citrus juice, salt, and vinegar. A vegetarian meal accent and palate stimulant involves steamed dal, pulses, or taro served with green pepper and onion chutney. In northeastern India, coconut and soybeans form the basis of a spicy sauce.

In the 1600s, voyagers to India and the Spice Islands shipped native condiments to England, France, and Iberia for sale in upscale grocery shops. Hostesses served gooseberry chutney sauces and piccalilli (pickled vegetable relish) with breakfast toast, cheese and crackers at tiffin (snack time), and tea cakes. Portuguese fanciers topped beefsteak with mango chutney; Brazilians complemented goat, quail, and sausages with chutney. One complicated savory, devils on horse back, began with dates or pitted prunes stuffed with green mango chutney and wrapped in bacon for grilling and serving on toast points as a Yuletide appetizer in rural restaurants.

From Europe, colonial authorities carried chutney recipes to the American South, Australia, Brazil, British East and West Africa, Canada, Guiana, Indonesia, and South Africa, where cooks based a fruit relish on the grilled banana.

Indonesian grilled lamb acquired complex tastes from a cashew and ginger marinade. In the West Indies, papaya chutney dominated table relishes with the tang of lime juice and rice wine vinegar and the color of fruit and red onion. Papain in raw papaya added tenderizer to marinades. Jamaican recipes favored the tart tamarind as a contrast to sweet mangos and pawpaws.

In the Virginia Colony, green tomato chutney became a standard accompaniment to fish fillets and slices of chicken, ham, and pork. Another favorite blended Bing cherries, nectarines, peaches, pineapple, or rhubarb with mint, onions, port wine, sugar, and red wine vinegar. Maryland barbecuers sauced slow-roasted pork with fruit chutney blended with bourbon whiskey and onions. In New Orleans, Louisiana, bottled chutney topped curried chicken sandwiches; cilantro chutney spiced crawfish balls. Galatoire's restaurant served foie gras with a fruity chutney made from black cherries, pears, and mangos flavored with champagne vinegar, garlic, scallions, and thyme.

New England cooks concocted an American original from indigenous blueberries or cranberries and tart apples, blended with allspice, candied citrus peel, clove, ginger, and mustard, and served the sauce with holiday turkey. Pennsylvania Dutch cooks made a homestead version of chutney by promoting "seven sweets and seven sours," a contrast of flavors made by sweetening pickled chowchow (vegetable relish) with cane sugar and souring the mix with celery and mustard seeds, turmeric, and vinegar.

English and European manufacturers marketed imitations of Asian relish recipes under the brand names Bengal Club, Colonel Skinner's, and Major Grey's Mango Chutney, a fad condiment made with raisins and lime juice and sold in England and Singapore. After the formation of Crosse & Blackwell food brands in 1830, the company showcased Major Grey's label, which appeared in advertisements in the *Chinese Times*. By the mid-1800s, Anglo-Indians were serving chutney with curry at formal dinners and in restaurants as a stimulating dressing for meats and salads and accompanying plates of fruit and cheese. Unlike Asian cooks, who ground spices in a mortar, British factories boiled down apples, pears, or mangos and mixed them with onions, raisins, sugar, and vinegar.

To assist military wives living in India and Burma, British cookbooks, such as the anonymous soldier's *Anglo-Indian Recipe Book* (1840) and *Emma Tillotson's Recipe Book* (1842), enlightened them on the local produce suitable for homemade

chutneys. Victorian hosts served the piquant sauces on dry beans and roast meats. From 1848 to 1849, the heavy application of cane sugar and molasses in bottled sauces resulted in Parliamentary debate of a chutney tax. In 1880, an international exhibition of foods in Melbourne, Australia, featured local bottled chutneys alongside imports from India.

By 1906, the port of New York collected a chutney tariff leveled on imported pickles, sauces, and “sweet-meats.” Benjamin Smith Lyman’s compendium *Vegetarian Diet and Dishes* (1917) and Louise Andrea’s *Home Canning, Drying and Preserving* (1918) featured chutney dishes, which included a “grand salad” and apple, cranberry, green to

[Recipe: South Indian Tomato Chutney](#)

Fry six red chilies in 1 tablespoon of sesame oil. Add one sprig of curry leaves, 1 tablespoon of whole coriander seeds, 1 teaspoon of sambar powder (pigeon peas and tamarind), 1/2 teaspoon of grated ginger, 1/4 cup chopped spring onion, and one pinch of asafetida and sauté. Add three chopped tomatoes and simmer until the pulp softens. Cool and grind the mix with 1 teaspoon of salt and 1/4 teaspoon of tamarind paste. In 1 tablespoon of sesame oil, heat a sprig of curry leaves with 1/2 teaspoon of black mustard seeds until the seeds pop. Pour this dressing over the tomato sauce mixture and stir. Serve with kebabs or vegetable pilaf.

mato, and mashed potato chutneys. Also in 1918, the *Bulletin of the U.S. Department of Agriculture* listed chutneys imported from Cambodia, China, and Samoa. Chutney making also provided employment for food processors in Jamaica and Puerto Rico.

See also: Arab Diet and Cuisine; Dal; Pickling; Restaurants.

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Cider

A fermented apple juice, cider derives from the pressing of one variety of cider apple or from a blend of sweet, sharp, bittersharp, and bittersweet stock.

Ancient Origins

Apples appear in cave art from as early as 35,000 B.C.E. and in trade records from 6000 B.C.E. Although details are sketchy about the fermentation of cider, from 1300 B.C.E., apple juice or cider appears to have been popular with ancient Egyptians, Greeks, Israelites, and Phoenicians.

A specialty of East Anglia and southwest England, British cider dates to the first century B.C.E., when Iberian nomads introduced *shekar* (fermented cider). Whole fruit pressers extruded apple and pear juice and converted it in wood casks with the wild yeasts living in the air and on fruit skins. The conversion of sugar to alcohol by malolactic action preserved harvest time flavors year-round. Apple wine, made from dessert apples, contained the most sugar. Even windfalls found a place in cider commerce as scrumpy, a coarse, cloudy drink squeezed out of partially rotted, unmarketable fruit.



Workers at an English orchard use a traditional hand press to squeeze and filter apple juice. Since the first century B.C.E., fruit pressers in England have converted juice to cider by fermenting it in wood casks. Cider remains extremely popular in the U.K. today. (Fox Photos/ Getty Images)

Apple cultivation spread across Roman conquests, including Iberia. After the Roman occupation of Kent in 55 B.C.E., the forces of Julius Caesar embraced Celtic cider and *posca* (cider vinegar) drinking for refreshment. Rather than apply local water to casualties in field hospitals, medics chose antiseptic apple beverages to cleanse and debride wounds. Veteran legionaries who received land allotments in Gaul, Iberia, and northern Italy grew apple orchards as an investment and turned fruit into *pomorum* (fruit drinks).

Middle Ages

After 800 C.E., the Frankish king and Holy Roman Emperor Charlemagne hired brewers to extract *pommé* (apple juice) and perry (pear juice) from his orchards. Following the Norman Conquest of England in 1066, monks specialized in the growing, grafting, and pruning of abbey *pomeria* (apple gardens) at Canterbury

and Ely. They supervised fermentation and sale of cider, a favorite thirst quencher of haymakers and corn harvesters, who accepted tuns of cider as some 20 percent of their wages.

The invention of the cider press in the 1200s increased late-medieval consumption of the fizzy juice and the use of cider and perry to pay rents and tithes. By the end of the Middle Ages, throughout England and Normandy, mulled cider flavored with allspice, cinnamon, clove, and nutmeg dominated table and recreational drinking. The English drank the health of their apple trees between December 24 and Twelfth Night by going

[Recipe: Mulled Cider](#)

Peel and core an apple and slice it into thin wedges. Place the wedges in a saucepan and add 1/2 gallon of cider, 1 tablespoon of honey or *muscovado* (dark brown) sugar, five whole cloves, two cardamom pods, one cinnamon stick, 1 inch of peeled, fresh gingerroot, and 1/2 teaspoon of allspice. Heat gently in an electric slow cooker. Add the juice and zest of one lemon and one orange and 6 tablespoons of cider brandy (Calvados). Ladle from a punch bowl into tall mugs and top each with a sprinkle of nutmeg.

wassailing, a ritual blessing of the coming year's cider apples to ensure wellness.

Advances

Renaissance tree grafting and cultivation of orchards improved in France, where orchardists preferred the Costard, Pearmain, and Pomme d'Espice varieties for draft cider. The latter cultivar was the favorite of Francis I, who kept a private stock of cider barrels. The reputation of French apples intrigued Henry VIII, who had his fruiterer, Richard Harris, import pippin saplings to Teynham, Kent, in 1533. Apple specialist Guillaume D'Ursus recorded his success on the Cherbourg Peninsula in March 1553, where he practiced Basque cider-making skills. The blending of sour-sweet fruit for delicate flavor with acid fruit for clarity resulted

in a distinguished cider renowned for its aroma and flavor.

In 1588, Norman cider maker and physician Julien Le Paulmier issued *De Vino et Pomaceo (On Wine and Cider)*, a treatise that named 82 apple varieties and extolled apple juice as a healthful drink. During the reign of Louis XIII (1610–1643), Norman farmers avoided heavy taxes on vineyards by replacing them with apple orchards. In the mid-1700s, heirloom apples and prize runs of cider won agricultural awards. Because canker destroyed English orchards in the 1810s, growers returned to France to buy Medaille d’Or and Michelin cultivars to graft onto British varieties, the Albemarle Pippin, Foxwhelp, Kingston Black, Morgan’s Sweet, Redstreak, Sweet Alford, and Woodbine.

New World

North American aborigines made crab apple cider in prehistory. The colonial era differentiated between eating and cooking apples and cider apples, which included small wild crab apples and the Shawmut, planted at Boston in 1623. By 1635, America’s first apple cultivar, the Yellow Sweeting, was growing at Rhode Island homesteads. Along the Chesapeake Sound, women superintended the ciding process.

In 1647 at New Amsterdam (later, New York), Dutch immigrants grafted orchard stock with the Summer Bonchretien, a juicy, sweet pear. Huguenots brought the Pomme Royale (or Spice Apple) in 1600; the Newtown Pippin flourished as a “tankard apple” from 1730. As settlers pushed west, they spread apple and pear residue and seeds over their fields, encouraging the sprouting of new trees from Atlantic Coast stock.

In 1792, John Chapman, the legendary Johnny Appleseed, opened a Pennsylvania nursery in the Susquehanna Valley and spread fruit tree seedlings throughout Ohio and Indiana as a means of improving government land grants. To spread apple harvesting over the seasons, orchardists grafted a single trunk with different varieties of apples that ripened from early spring to autumn. The extended season supplied farm cider mills with fruit for beverages to replace questionable water sources.

America's National Drink

The lack of grain alcohol at tap houses produced a demand for beverages, which growers supplied with corn and pumpkin beer, fermented maple sap, and persimmon beer. To turn sugar into alcohol, they fermented apple drinks into sweet (or fresh) cider and hard (or fermented) cider, the country's national drink. Because the complex flavors paired well with entrées and desserts and as travelers' refreshment, barrels of cider served country folk as bartering elements.

Philadelphians preferred applejack, America's indigenous distilled beverage. A strong cider brandy, it results from "jacking," or freezing, hard cider through the winter to concentrate flavors and raise the alcohol content. In New Jersey, road builders accepted jugged applejack in lieu of wages. From Laird & Company in Scobeyville, New Jersey, the oldest applejack distillery, the manufacture of strong apple drink spread to Virginia, Tennessee, the Carolinas, and Georgia. Applejack suited the soaking of pound cake and the basting of roast meats, such as a pig shoulder coated in pepper and onions.

From abundant Liberty, Macintosh, and Northern Spy apples, colonial cider makers produced pleasing drinks at the rate of 300,000 gallons (1.14 million liters) a year. The drink suited the tastes of the Continental Army as well as the first presidents, George Washington, John Adams, and Thomas Jefferson. Promoters linked cider drinking three times a day with longevity.

By 1800, Massachusetts residents were drinking 35 gallons (132 liters) of cider per person annually. Parents soaked pomace (apple pulp) in water for ciderkin, a children's drink mixed with ginger and molasses. (Perkin, a similar drink made from pear pulp, never gained the popularity of ciderkin.) Soldiers during the Civil War bought cider, ciderkin, and applejack from commissaries. By 1872, American orchardists raised nearly 1,100 apple cultivars. Trees produced varied stock for blended ciders and cider vinegars, which merchants exported to the British Isles, Europe, and the West Indies.

Decline and Resurgence

During this same period, the immigration of Eastern Europe and German brewers to the United States raised the popularity of beer over cider. As urban

populations grew, the shrinking number of smallholders continued the traditional cider making as an annual chore. To increase the appeal of cider, fermenters added honey, raisins, rum, and sugar to boost alcoholic content from 2 percent to 7.5 percent. At restaurants and saloons, barkeeps fermented apple juice with glucose, pepper, vinegar, and whiskey, thus destroying the reputation of a favorite country beverage.

In England, the Industrial Revolution lured farm-workers to the city and decreased interest in cider making. In the late 1800s, disease altered the fruit harvests on both sides of the Atlantic. In the United States, apple scab and codling moths precipitated the burning of apple orchards and cider mills. At the same time, because of fungus in grapevines, French apple orchards increased in three decades from 4 million hectares (10 million acres) to 14 million hectares (35 million acres).

As World War I began in Europe in 1914, French ciderists agreed to government seizure of cider tuns to provide alcohol for defense needs. The temperance movement and Prohibition in 1919 ended the commercial success of U.S. cider, lowering production to 13 million gallons (49 million liters)—from 55 million gallons (208 million liters) at the height of popularity in 1899. After Prohibition, brewing ale became more profitable than making cider.

World War II unleashed devastation on British and Continental orchards. Postwar commodities development subsequently abandoned traditional apple pressing and cider making until gourmet drinkers rediscovered the drink in the 1990s.

In the 2000s, a resurgence of interest in artisanal or heritage and Slow Foods in the United States and Europe invigorated demand for the Baldwin and Roxbury Russet apples and restored cider to popularity. In Germany, the making of *apfelwein* (apple wine) from Bramley and Granny Smith cultivars required the addition of *Sorbus domestica*, or astringent ser viceberries for flavoring. Newcomers to cider drinking boosted the sale of beverages from small cider houses to farmer's markets and to buyers in China. Health authorities list applesauce and cider as reducers of bad cholesterol in the arteries and preventers of cancer and coronary disease.

See also: Adulterated Food; Alcoholic Beverages; Fermented Foods; Honey;

Medieval Diet and Cuisine; Prohibition.

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Clipper Ships

From the late 1770s to 1869, hydrodynamically efficient clipper ships sped global food distribution at the rate of 400 miles (640 kilometers) per day. Clippers traveled at four times the speed of deep-draft merchantmen, thereby delivering fresher produce to markets in London, Baltimore, Boston, New York, and Salem. Built in England, Scotland, and the United States, with some competition from Canada, France, and Holland, the canvas-heavy topsail schooner featured a U-shaped hull and an uplifted concave bow that sliced through ocean waters.

Captains set their courses to follow ocean currents and trade winds. Ranging above sleek, yacht-like hulls some 20 stories, an elaborate web of canvas and rope required precision teamwork by skilled seamen. On return trips to Canton (Guangzhou) in China, some carried apples as well as ice slabs cut from ponds and packed in straw for use in hospitals and restaurants in the tropics. During the War of 1812, the American clipper forerunners *Harvey* and *Pride of Baltimore II* captured British traders and redirected to American ware houses the provisions intended for the British army. For their beauty and craftsmanship, the multiuse clippers earned the name "queens of the sea."

By 1819, square-riggers, called "tall ships," acquired a rakish reputation for their use in speeding opium from China to India. For the delivery of coffee,

indigo, rice, spices, and tea, the British East India Company (BEIC) favored trading vessels that hastened over trade routes around the globe and crewed them with British seamen, some veterans of the Royal Navy. On the journey from Java or Malabar to England, coffee beans mellowed to a rich, low-acid flavor, a boon to profits. With the introduction of *Camellia sinensis assamica* tea from Assam, India, in the late 1830s, the BEIC purchased American clipper ships to sate world demand for Asian beverages.

American redesign of the clipper in 1841 thrust the U.S. merchant marine into direct competition for Asian goods. New demand for foodstuffs and equipment for miners following the California Gold Rush of 1848 offered clipper owners the handsome exchange of overpriced goods to pioneers wielding the unprecedented purchasing power of gold dust. Shippers sold beef, flour, and pork for \$60 per barrel and coffee, sugar, and tea for \$4 per pound. Whiskey brought \$40 per quart and laudanum \$1 per drop.

Commerce and Nationalism

During the Age of Transportation, clippers boosted the American ego in a race to surpass British dominance in food transport and marketing. In the late 1840s, the profits from fast sails around Cape Horn, Chile, inspired Robert Henry “Bully Bob” Waterman, the New York—born captain of the *Sea Witch*, to padlock ropes to prevent crew from reducing sail over the dangerous route around Tierra del Fuego. His records for speed still stand, as does his reputation for harsh discipline of slackers.

In 1851, Boston shipwright Donald McKay, an immigrant from Nova Scotia, launched the *Flying Cloud*, the first of a series of bigger, faster “extreme clippers,” which carried high-profit perishables from Australia, China, the East Indies, and Hawaii. His pride in accomplishment appeared in the naming of subsequent clippers, the *Sovereign of the Seas*, *Chariot of Fame*, and *Great Republic*, at 400 feet (122 meters) the largest clipper ever built.

Captains anchored their vessels off Chinese harbors in mid-June to await processing of the April pekoe harvest, a high-priced commodity known as “first flush” tea. After Foochow (Fuzhou), the port of choice following the 1842 Treaty

of Nanking (Nanjing), opened five ports to trade with Great Britain, agents negotiated commodity prices. Junks, lighters, and sampans delivered rattan-wrapped tea chests around the clock. Clipper crews measured the chests with calipers and hammered them into place in the hold. A tight pack above planking covering ballast of beach pebbles or scrap metal stopped the lightweight tea from shifting on the passage. Topped with a tarpaulin, the chests held firm in hatches sealed tight against leakage or swamping by heavy seas. The clippers' iron-over-wood hulls featured gutta-percha caulk, which kept holds dry and tea safe from unforeseen soaks in seawater.

Clipper Engineering

To escape food tariffs and port dues, Alexander Hall and Sons of Aberdeen, Scotland, designed the *Scottish Maid* to reduce hull tonnage. From 1844 to 1846, American naval designer John Willis Griffiths's promotion of the *Rainbow*, *Houqua*, and *Sea Witch* advanced rapid global voyages, covering the New York-to-Canton route in as little as 78 days. American ships began making headlines in 1850, when the *Oriental*, the first U.S. clipper to trade in London, carried 1,600 tons (1,450 metric tons) of tea from Canton and earned \$48,000, a cargo fee nearly equal to the cost of the ship's construction.

In 1866, the Great Tea Race pitted the top contenders—the Scots-built *Ariel* and *Taeping*—in a dash from China to London with the year's first tea picking. On September 12, the clippers arrived on the same tide. The *Taeping* won by ten minutes after a 16,000-mile (26,000-kilometer) sail that encompassed the South China Sea, Indian Ocean, Atlantic Ocean, and English Channel. Tea companies rewarded the winner for delivering the season's first batch, which tea snobs began purchasing the next morning.

For its dash and trim looks, the clipper earned the name "greyhound of the sea." At Manhattan dockyards, leather merchant George Francis Gilman and dry goods clerk George Huntington Hartford, the original partners of the Great American Tea Company, sold cut-rate Chinese and Japanese tea straight from the cargo holds by negotiating price directly with the crew and edging out the middleman. In this manner, consumers could buy tea as well as allspice,

cinnamon, clove, ginger, mustard, and pepper on credit at bulk rates of one-third retail cost. A full-page ad in the 1865 *Horticulturist* exploited the glamour of the clipper ship by announcing the importation of 22,000 half chests of tea aboard the *Golden State*, owned by Jacob Aaron Westervelt, mayor of New York City.

The spread of coffee rust, a plant fungus, in Ceylon, China, and Malaysia raised coffee prices and fueled demand for tea. Ad copy targeted tea drinkers with the choice of Assam, Bey-Jop, Celinrus, Congo, Foochow, Formosa, green gunpowder, young Hyson, imperial, moyune, oolong, orange pekoe, silver leaf, souchong, and sun-dried varieties grown on the Great American Tea Company's private tea plantations. In 1869, Hartford renamed his company the Great Atlantic & Pacific Tea Company, which developed into the modern grocery chain known as A&P.

See also: British East India Company; Maritime Trade Routes; Spices; Tea; Trading Vessels.

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[Coconut](#)

A wholesome, versatile native of the tropics, the coconut palm bolsters the world's wild foods with the water and flesh of the fruit, which also yields coconut jelly, milk, and oil. A high-protein energy food rich in iron, phosphorus,

and zinc, the coconut originated in Melanesia and flourished between the Tropic of Cancer and the Tropic of Capricorn as a trade item. For a half million years, it provided nourishment from its natural dish. The willowy *Cocos nucifera* palm spread about the world by ocean currents, and after 2000 B.C.E., with the aid of Polynesian colonizers, the tree journeyed by outrigger from New Guinea to Tahiti. Arab traders extended the fame of the coconut, which they transported from the Maldives and Zanzibar to England.

The nutrition from coconuts balanced the island diet, providing benefits for dental health, weight control, and medicines from palm roots for dysentery and cholera. Mariners bore the coconut west over the Indian Ocean to Madagascar, the Cape Verde Islands, and Angola by 60 C.E. and completed the encircling of the globe in 86 countries by planting the palm in Central and South America, Egypt, and Queensland, Australia. On the Nicobar Islands, palm fruit became so valuable that it doubled as currency.

The coconut appears in Sanskrit and Tamil writings and in the Hindu epic *Ramayana* (ca. 400 B.C.E.) and in food ritual emerging from the Puranas (200–400 C.E.), the creation lore of the Gupta Empire. In 1501, the reports of Portuguese mariner Vasco da Gama to King Manuel I lauded the coconut as a source of arrack (liquor), sugar, vinegar, and wine and as a handy travel food.

Ferdinand Magellan, the first circumnavigator of the world, replenished failing ship's stores on Guam in March 1521 by loading the galley with coconuts. In the mid-1500s, Portuguese and Spanish seafarers made a joke about the three eyes on the blossom end, which they named "coco" for "grinning face." In *A New Voyage Round the World* (1699), English sea raider and cartographer William Dampier found ample coconut palms in New Guinea. In 1686, he discoursed at length on the young fruit in India as a source of "pap," a soft, jellied flesh scooped out like pudding, and of water for boiling poultry or rice.

Upon receipt of coconuts from sailors, the British turned the grated meat into a flavoring for cakes and cookies and used whole coconuts for toss games called the Coconut Shy. In the early 1800s, imported coconut oil replaced whale oil and tallow in hand soaps. Cigarettes featured charcoal filters made from husks; solids provided high-energy food for race horses. Investors met demand by establishing plantations in Australia, the Caribbean, the Dutch East Indies, Fiji, Malaya, and Sri Lanka.

In 1888, brothers Josiah and Henry Vavasseur, British engineers, proposed a more cost-effective method of importing coconuts to Europe. By drying the meat into copra, they made packing easier and lighter without lowering quality. In 1900, annual shipments rose tenfold to 60,000 tons (54,400 metric tons). In 1895, Philadelphia food miller Franklin Baker further simplified shipping from the Philippines by selling coconut flesh shredded and dehydrated.

The availability from Philippine plantations of coconut removed from the shell and ready for cooking initiated a U.S. food fad in the early 1900s for coconut cake, cream pie, custard, frosting, and macaroons. For Southern ambrosia, a Yuletide treat, cooks layered shredded coconut with orange slices, sprinkled on confectioner's sugar, and topped the mix with Southern Comfort, a sweet whiskey liqueur. Canned hearts of palm added texture to salads, soups, and stir-fries.

Coconut profits remained high until the Great Depression. During World War II, medical units short of intravenous glucose substituted coconut water, which arrived sterile in the shell. The Pacific War of the 1940s curtailed coconut exports, producing a global dearth of vegetable oil.

Coconut remains a pantropical arboricultural foodstuff. In the southern Malay Peninsula and Thailand, grove managers train Sunda macaques to harvest the nuts. Hainan Islanders express coconut juice to sell in China and Southeast Asia. In Vietnam, pushcarts display whole fruit sold for nut water. A coconut knife or screwdriver inserted into the open end extracts a spiral of meat for eating fresh. Freezing softens the meat and reduces its natural crunch.

Copra, the dehydrated flesh of the coconut, requires fire-or sun-drying, smoking, or layering in ovens, often fueled by burning palm husks. Pressure during milling or centrifuging releases oil from the thick fiber, a by-product that farmers feed to livestock. The oil is a common additive to confections and nondairy creamers.

In southern Asia, cooks make coconut milk by shredding the flesh into a cloth, pouring on hot water, and rolling and squeezing the cloth to express a cooking cream. Melanesians heat the cream to evaporate the water. The sweet milk enhances the bland taste of cassava, fish, rice, sweet potato, tapioca, taro, and yams. Fermented sap yields a powerful alcoholic drink and, when evaporated, produces sugar. Because coconut oil is stable at high heat, it is valuable for deep-

frying and popping corn.

After some 70 years of blame for clogging arteries, the coconut returned to respectability in the 2000s. Consumers sip coconut water through a straw and scoop the jelly with a spoon. Recipes specify the oil for flavoring chutney, curry, ice cream, jam, muesli, oatmeal, pastry, raw food and vegan meals, stir-fries, and diets for diabetics. Because of the oil's similarity to human breast milk, it bolsters baby formula and children's toddy.

Despite thousands of years of anecdotal evidence to the contrary, muddled understanding of saturated fats in the 1950s defamed the coconut as a dangerous food. Although hydrogenated coconut oil contains trans fat, virgin coconut oil appears to be harmless to the cardiovascular system. Recent studies reclaim the coconut as a thyroid stimulant, cholesterol and hypoglycemia control, boost to the immune system, fungus and yeast deterrent, and suppressor of human immunodeficiency virus (HIV).

See also: Heritage Foods; Ibn Battuta; Maritime Trade Routes; Polo, Marco; Storage, Food.

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Cod

A popular food fish in Great Britain, Iberia, North America, and Scandinavia, cod has amplified the economies of nations in the Northern Hemisphere since the

1500s. From prehistory, preserving fresh catches involved whole families, who gathered on seashores and cliff sides to gut and filet the easily boned body and to smoke two delicacies, the roe and liver. The air-dried fish had a shelf life of several years, thus supplying daily needs as well as ensuring famine food during crises and disasters.

A cod-based cuisine developed north of the equator in maritime cultures. From 5400 B.C.E., the Mesolithic Ertebolle, hunter-gatherers of Denmark, relied on cod for subsistence, as did the Alaskan Tlingit in 3000 B.C.E. From 50 C.E., the Abenaki of Damariscotta River, Maine, varied their cod intake with alewife, clam, eider duck, oysters, shad, sturgeon, and venison. The Inuit ate cod livers with bilberries, cranberries, and crowberries. On Chinese junks, the crews' 1,900-calorie daily meal consisted of 1,000 grams (35 ounces), or 53 percent, of cod or herring and the remaining 47 percent of cabbage, rice, and tea.

Salt Cod Industry

For transport, salting extended the shelf life of cod or stockfish, which absorbed the brine readily because of its low fat content. In the 700s, Italian *baccalà* (salt cod) provided the peasant cook with a cheap, convenient main dish seasoned with garlic and mustard. A transportable food at a low price, heavily salted filets required soaking in several changes of water before grilling or frying. Elements of the Mediterranean diet—anchovies, cheese, eggs, garlic, olives and olive oil, onions, and wine vinegar—contributed to satisfying Portuguese fish dishes, including *baccalao* (cod stew).

Around 800, the availability of salt enabled the Vikings to establish salting stations in Iceland and Greenland and to market Baltic cod, which achieved a demand far from marine centers. In the 900s, Viking trade networks developed long boat holds to accommodate bulk stowage of dried Norwegian cod from Ribe in Jutland to sell in Asia, Greenland, and Western Europe, where the French pickled the fish in brine. By 1000, Nordic fishermen expanded their seafood processing to Newfoundland. Varangian and Viking trading vessels bore dried cod and mead as far south as Byzantium.

By desiccating and salting fish, dealers drew out excess water, reducing the

weight of their unscaled catch by up to 80 percent and simplifying packing and transport. Along the North Sea, Norwegians dehydrated cod as the basis of their food industry and as currency. New England and the Grand Banks east of Newfoundland profited from salt cod, which they marketed in eastern South America, West Africa, and the West Indies. Additional fisheries flourished in Brittany and Holland.

Dried fish remained abundant in imports from the Faeroe Islands, Iceland, and Norway and supplied the cuisines of Brazil, the Caribbean, the Mediterranean, and Northern Europe. *Le Viandier* (*The Provisioner*, ca. 1375), a sourcebook of medieval cuisine by Taillevent, the head chef of King Charles V of France, advised readers on how to leach salt from cod to freshen a sweet, densely flaked fish and top it with mustard sauce. By the 1390s, the Hanseatic League, a trade alliance in Lübeck, Germany, superintended cod and grain commerce from Novgorod, Russia, southeast over the Baltic Sea through Riga and Danzig to Lübeck and Hamburg and over the North Sea to Bergen and Bruges.

In the 1400s, Basques abandoned whale drying and began processing cod, a popular food throughout the Mediterranean and North Africa for its lean, white meat. Approval by the Catholic Church increased demand for fish on holy days. Portuguese fish processors drew on saltworks in Aveiro and Setúbal for supplies. From Basque and Portuguese settlers of the Canadian Maritime provinces, the Beothuk of Newfoundland and the Micmac of Nova Scotia and the Gaspé Peninsula of Quebec learned to layer cod, oysters, and venison in barrels with generous sprinklings of rock salt. The shore industry was still in operation in 1497, when English explorer John Cabot made his observations of teeming schools of cod.

As red meat consumption decreased, the consumption of cod spread far beyond cold northern waters as a Renaissance fad. Catalans baked cod to flavor with *allioli* (garlic mayonnaise). Andalusians made a salad of cod with orange slices, simmered it into chowder, or cooked the fish with beans. Basque chefs folded fish chunks in tortillas. In 1442 in Naples, Catalan cooks introduced the fish as *baccalà*, flavored with honey, pine nuts, and prunes, fried into fritters, or turned into soup with wild mushrooms.

Throughout the Renaissance, cod maintained a reputation as the food of peasants, sailors, and slaves. During the Spanish colonization of Mesoamerica

after 1519, Dominican priest and chronicler of Spanish history Bartolomé de Las Casas surveyed and defended the lifestyle of Indians from Cuba to Peru. He resented the enslavement of Lucayan pearl divers, who lived on cod and corn bread while diving repeatedly in search of oysters. Because of fatigue and malnutrition, few divers lived longer than a year in service to the Spanish.

In Tudor England, stockfish fed the commoner. Table fare of aristocrats favored beef and game served with soft white wheat loaves and relegated boiled vegetable potage, oat or rye bread, and salt cod to paupers. As expeditions departed the naval marinas of Elizabeth I, the British navy heightened demand for imported corned beef and salt cod as galley provisions. Fishermen met the demand, catching as many as 400 cod daily per man and stowing up to 25,000 per trawler in salt holds.

During the 1600s, when salt was cheap, families awaited fresh catches of cod for drying. French West Indians subsisted on salt cod and cassava root, the main source of bread for workers and slaves. Portuguese mariners received measured amounts of biscuit and stockfish as their daily rations. On long voyages to Brazil, Guinea, and India, a high death rate from scurvy sapped Portuguese naval crews, who had relied on cod for galley supplies.

At the close of the Renaissance, 60 percent of European fish purchases were cod, which sold for 4 cents in Spain per 100 grams (3.5 ounces), as opposed to 4.5 cents for tuna, 5.7 cents for mutton, and 8 cents for hake. From the Popham experiment, the Pilgrims learned how to prepare for difficult winters by setting up fishing stations to provide enough cod and shellfish to sustain a colony until spring.

In 1614, Captain John Smith led an expedition from the English settlement at Jamestown, Virginia, to study the New England coastline from Penobscot Bay, Maine, to Cape Cod, Massachusetts. He realized that salt cod promised wealth to American shippers and enriched himself selling dried fish to the English and Spanish. Smith's prediction proved true in the colonies, which supported 1,000 fishermen in 440 trawlers by 1675. Fisheries profited by producing 6,900 tons (6,250 metric tons) of fish annually and by shipping salt cod to slaving camps in West Africa.

Into the late 1600s, the salt cod industry increased its business by 300 percent. One upsurge came from traders who supplied dried beef and salt cod to the

privateers at Tortuga, Haiti. During the codfishing and whaling heyday, the cracker industry became one of North America's first processed food industries. A period recipe for party chowder combined cod with crackers and salt pork to feed "a large fishing party." English cook Robert May, author of *The Accomplisht Cook* (1685), recommended cod pie, an elaborate mincemeat concoction of apple, caraway seed, cinnamon, currants, dates, ginger, lemon, pepper, raisins, rosewater, sugar, verjuice (green grape juice), and wine.



A period engraving depicts cod fishing, curing, and drying in Newfoundland during the 1730s. As a key item in the triangle trade network, salted Atlantic cod, the first major commodity of the New World, found buyers in Europe, Africa, and the Caribbean. (*The Granger Collection, New York*)

Commerce

Ironically, while Atlantic hostilities escalated over fishing rights for the next century, few fleets targeted the Pacific cod off the Fox Islands of Alaska, which remained virtually unfished. The nomadic Canadian Eskimo flourished at commercial open-water fishing for cod and halibut, two Scandinavian staples. At the conclusion of the Seven Years' War in 1763, France ceded North American territory to the British but kept the cod fisheries off Newfoundland, Miquelon,

and Saint Pierre.

British statesman William Pitt regretted that England gave up a profitable food industry. His lament proved prophetic of the growth of the cod trade in Massachusetts and Newfoundland and the reciprocal trade between New England fishermen and Caribbean molasses vendors. The “codfish aristocracy” of Massachusetts flaunted the source of their prosperity by decorating their mansions and the Boston Town Hall with carved fish.

Beginning in 1774, the Royal Greenland Trade Department (Den Kongelige Grønlandske Handel, or KGH) monopolized commerce between the Inuit and Denmark for the next two centuries. The Hudson’s Bay Company commodities trade succeeded at a global interchange of cod and wheat. By the early 1800s, the salt cod industry undergirded the economy of Labrador and Newfoundland.

The poor welcomed methods of cooking stockfish to full advantage. *Mrs. Hale’s Receipts for the Million* (1852), by cookbook compiler Sarah Josepha Hale, suggested uses for cod heads as a means of trimming kitchen waste. In Jamaica and Puerto Rico, a popular island recipe called for the boiling of rice and salt pork with cod tails and scraps for a make-do peasant dish. An upscale recipe from Neapolitan food writer Ippolito Cavalcanti’s *Cucina Casereccia in Dialetto Napolitano* (*Home Cooking in Neapolitan Dialect*, 1847) introduced the tomato to fish sauce as a complement to the delicate flavor of stockfish.

The addition of cod liver oil to orange juice decreased the incidence of rickets and scurvy by supplying the body with vitamins A, D, and E and omega-3 fatty acids. Adults consumed the oil to boost the nutrition of breast milk and as a treatment for arthritis. In 1865, German Baron von Liebig, the founder of physiological chemistry, began manufacturing Extract of Malt, a nutritious food more palatable to children than cod liver oil, which left a fishy aftertaste.

In a period when fishermen processed Pacific catches of cod at San Francisco and Sausalito, California, and at Pirate Cove and Unga, Alaska, the West Coast never attained the success of New England and Newfoundland. In 1893, when the Sears catalog was advertising pantry stocks of crackers and salt cod, the future of cheap salt fish seemed unfavorable. Denmark charged the British with endangering fishing grounds off the Faeroe Islands. Confiscation of British trawlers resulted in fines and the impounding of vessels and their catch. In April 1899, Danes arrested the captain and fired on the British trawler *Caspian*, which

escaped back to England. Hostility between Denmark and England over fishing grounds continued until the beginning of World War I.

In the 1900s, cod fishing gained strength in the Bering Sea and the Aleutian Islands as far south as Puget Sound, Washington, in part because of the investment of Edward Pond. His profits dwindled from hostile engagements with Russian gunboats. The financial picture shifted in 1920, when nutritionists began debating the health benefits of cod liver oil, which evidence in the *Journal of the American Medical Association* championed as a treatment for consumption and rickets. In 1940, grocery store advertisements lauded healthful, high-energy foods, especially oatmeal and cod liver oil.

Threatened Species

Because of the suppression of the fishing industry during World War II, enormous schools of cod thrived in the Barents Sea, English Channel, Irish Sea, and North Sea. The exploitation, or overfishing, of cod in the 1950s threatened the range of diet available to shore folk. The resulting Cod Wars between Iceland and the United Kingdom exacerbated quandaries over the future of cod in the North Atlantic. When the Icelandic Coast Guard tried to enforce quotas within a 13-mile (21-kilometer) limit, the British Royal Navy shielded English fleets and engaged in net cutting and ramming of competing fishing vessels. The squabble ended in 1976 after the North Atlantic Treaty Organization (NATO) brokered a concession from the British that they would cease infringing on Iceland's territorial waters. Nonetheless, the protection of fish habitats failed to halt the 1980 crash of cod stock.

Currently, cod remains much in demand. Ice fishing among the Siberian Nenets and the Alaskan Aleut yields char and polar cod. The cuisine of some 50,000 Northern Sami of Norway and Sweden as well as Canadian menus feature lutefisk, a gelatinous entrée of cod or pollock softened and cured with lye that leached from birch ash. Dating to the Renaissance, the aromatic dish requires spices or butter to enhance the mild flavor.

Cod remains on the endangered species advisories of Greenpeace, Seafood Watch, and the World Wildlife Fund, with catches down by 70 percent. Scientists

predict that a 15-year moratorium on fishing may enable the former schools to regain strength and numbers. Canada continues to prohibit cod fishing in the Gulf of St. Lawrence and northeastern Newfoundland, but dishonest fishermen conceal illegal cod as “bycatch” or unintended targets. The short supply of cod forced British fish-and-chips shops to change their menus to include dogfish, haddock, hake, plaice, and skate.

In Australia and Canada, urban farming with aqua-ponics reduces the mileage that such crops as barramundi and cod travel to market, making local produce both cheaper and fresher. While Icelandic buffets continue displaying cod liver sausage and smoked milt and roe as well as wind-dried *saltfiskur* (cod), a traditional favorite, the British have retreated from the threatened species and embraced pollock as an inexpensive, sustainable substitute. Birds Eye, an international brand of frozen foods, followed a similar trend by replacing cod with pollock in fish sticks.

See also: Allergies, Food; Hudson’s Bay Company; Maritime Trade Routes; Pan-European Diet and Cuisine; Salt; Smoked Food; Virginia Company of Plymouth.

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Coffee

A staple brewed beverage identifiable on menus worldwide, coffee is the planet’s largest cash crop and most popular social lubricant. Release of enticing coffee aromas and savory oils requires roasting for 20 minutes at 500 degrees Fahrenheit

(260 degrees Celsius), which doubles the size of the bean. As addictive as chocolate, cola, *guarana*, *ilex guayusa*, tea, and yerba maté, coffee floods the nervous system with caffeine, a vegetable alkaloid that stimulates adrenaline flow and flushes the urinary system. Coffee fans favor the stimulus and sense of well-being, especially in the early morning.

The Oromo, a Cushite people of Ethiopia, Kenya, and Somalia, promoted the brewing of *Coffea arabica* in the ninth century C.E. Discoverers, according to Roman monk and educator Antonio Fausto Naironi's *De Saluberrima Potione Cahue (On Coffee, a Most Healthful Drink, 1671)*, admired the scent of roasting beans and the stimulation of *qahwa*, ground coffee boiled in water. The Persian physician Rhazes's nine-volume medical text *Al-Haiwi (The Virtuous Life, ca. 930)* recommended hot coffee for the stomach. A century later, Persian author Avicenna's *Al-Ganum fit-Tebb (The Canon of Medicine, 1025)* recognized the energizing effects of coffee on the limbs.

The cult of coffee breaks offered Muslims a bracing drink to replace the alcoholic beverages forbidden by Islam. Coffee service became a social equalizer and favorite creature comfort. At the same time, Arabian medical compendia also warned that too much coffee could cause confusion, depression, headache, heart palpitations, insomnia, and tremors. From the 1100s until the 1850s, officials of the Ethiopian Orthodox Church allowed religious prejudice to overrule taste by stigmatizing coffee as a Muslim drink.

In the 1400s, Sufist monks in Yemen drank coffee as a devotional revitalizer for midnight prayers. Galla nomads traversing North Africa cooked coffee porridge and formed coffee berries and fat into fist-sized balls to sustain them during raids on Abyssinia. Throughout the fifteenth century, Muslim pilgrims carried their favorite drink across the Levant and North Africa. Both Mecca and Cairo boasted *kaveh kanes* (coffee houses) in 1500. In 1511, an Arabic poem praised the pleasant energizer as "the beverage of the friends of God." At mid-decade, after Turkish middlemen eased into bean exports from their holdings in Yemen, Constantinople saw the establishment of a coffee culture.

Controversy arose over the allegation that coffee fostered gambling and illicit sex. In 1570, imams (prayer leaders) complained that the devout preferred a visit to the coffee bar rather than worship in the mosques. Conservative males in Yemen denounced coffee as a source of frivolity, sensual music, hashish

consumption, and harmful gossip. Suppression of the drink in Cairo and Mecca resulted in closure of secular espresso bars until Ottoman Turkish authorities overruled the ban in 1580. Although dealers forbade the removal of viable beans from Yemen, an Arab traveler, Baba Budan, smuggled ripe berries from the port of Mocha to Karnataka, India, thus spreading cultivation to Bali, Celebes, Java, Malabar, Sumatra, Sunda, and Timor.

From East to West

By the 1610s, Europeans discovered that Turks spent easeful hours in cafés conversing, partaking of opium and tobacco in hookahs (water pipes), playing backgammon, and sipping hot coffee. When Turks fell ill, they fasted and subsisted on coffee alone. Travelers noted the refreshment available in shaded marketplaces and cool cafés in Damascus, where Syrian males played checkers and chess and listened to storytellers. Trade with Middle Easterners brought arabica beans to St. Mark's Square in Venice, the first European coffee venue. In 1600, Pope Clement VIII alleviated guilt in Christians that they preferred a Muslim drink to tea.

Speculators for the British East India Company and Dutch East India Company imported Europe's first Turkish coffee. In 1637, Greek student Nathaniel Conopios, the future bishop of Smyrna, was England's first known coffee drinker. The nation's initial coffee service began in 1650 at Oxford's Grand Café and two years later in London at the establishment of Armenian restaurateur Pasqua Rosée in Cornhill. Cafés specializing in the hot brew developed into intellectual gathering spots for men seeking respite from taverns.

English patrons of any persuasion paid a penny entrance and tuppence (two pennies) a cup. In high-back seating, they received their mail, smoked and wrote letters, treated friends, and discussed the economy and politics. Partisans could choose Jesuit, Jewish, Papist, or Puritan cafés. Will's Coffee house appealed to intellectuals and the clergy; Man's, the fop's café, drew the fashionable as well as French spies. Seamen, middleclass merchants, cattlemen, and attorneys preferred Jonathan's. Those overcome by caffeinism (too much coffee) took a glass of cinnamon water or sarsaparilla as an antidote.

Health Effects

In addition to egalitarian café society and travel accommodation at caravansaries and inns, coffee drinking influenced the medical world. British physician William Harvey stimulated blood flow and treated drunkenness with coffee. A coffee ad from 1657 specified the use of coffee to cure consumption, dropsy (edema), eye sores, gout, headache, respiratory ills, scrofula, and scurvy. Medical writer Gideon Harvey's *Advice Against Plague* (1665) proclaimed coffee a deterrent to contagion. "The Women's Petition Against Coffee" (1674), intended to empty coffeehouses of recalcitrant husbands, declared the drink a "base, black, thick, nasty bitter stinking, nauseous Puddle water." Nonetheless, Englishmen continued to throng cafés as relaxing men's clubs promoting a civil drink. From consortia of coffee drinkers grew the Banker's Clearing-House, Lloyd's of London, the Royal Society, Stock Exchange, and the first newspapers, *The Tatler* and *The Spectator*.

By 1700, coffee houses drew devotees in Amsterdam, Hamburg, Marseilles, Paris, Boston, New York, and Philadelphia. In Vienna, brewmasters dispensed polite servings in demitasse cups, which came to the table with diminutive spoons for sugaring and stirring. Spanish barkeepers poured *carajillo*, a cup of coffee with a shot of brandy. Outside the British Isles, men and women flirted over steaming cups and overcame old approbation against mixed genders conversing in public. In Germany, women took a respite from house wifery with *Kaffeeklatsch*, a feminine version of the coffeehouse.

Because of coffee's immediate physical effects, Europeans forbade consumption by women of childbearing age to prevent infertility, miscarriages, and stillbirths. Females maintained that coffee was the cause of male impotence. In 1706, Daniel Duncan, a medical teacher at Montpellier, France, issued an advisory against abuse of hot chocolate, coffee, and tea. The French philosopher Voltaire countered that coffee had a "cerebral" effect. The source of the controversy, caffeine, remained unidentified until the collaboration of physician Friedlieb Ferdinand Runge with Johann Wolfgang von Goethe in 1819, when the two extracted the stimulant from Arabian mocha beans.

Crops and Culture

In the Western Hemisphere, the first coffee plantation on Martinique in 1720 precipitated culture of the bean in Argentina, Brazil, Costa Rica, French Guiana, Guadeloupe, Haiti, Martinique, and Mexico. From there, planters carried the plant to Ceylon, Kenya, Réunion, Sumatra, and Tanzania. Conditions for laborers turned bean production into a cause of uprisings and the eventual emancipation of slaves. In French colonies, maroons (runaway slaves) raided the plantations that produced 60 percent of the world's coffee. Insurgents set fire to hundreds of coffee plantations to impress whites with black outrage at profiteering at the expense of African slaves. The outbreak of the Haitian Revolution in 1791 precipitated a 13-year clash that ended in freedom for black islanders.

During the American Civil War, the absence of authentic coffee permeated journals and media articles with the need for a favorite drink. Southern cooks tested numerous substitute plants for the absent coffee bean. The most successful were acorns, beets, chicory, corn, dandelions, holly berries, melon seeds, okra seeds, peanuts, sweet potatoes, wheat, and yams. On July 8, 1861, when coffee was still available, the Sumter, South Carolina, *Tri-Weekly Watchman* advised cooks to cut ground coffee evenly with cornmeal to make supplies last. The Charleston, South Carolina, *Mercury* of February 8, 1862, offered a recipe for boiling and parching rye for coffee. As the war entered its last months, the demand for a coffee substitute reached epidemic proportions. The Yorkville, Georgia, *Enquirer* of January 21, 1863, offered a method of parching and grinding cane seed for coffee. The November 18 issue of the *Confederate Baptist* of Columbia, South Carolina, suggested blending dried potatoes with persimmon seed for coffee. Perhaps the worst substitute, English pea coffee, turned up in the June 30, 1864, edition of the Albany, Georgia, *Patriot*.

Coffee culture established itself in the social behaviors of industrialized nations. In the late 1800s, temperance activists advocated coffee as a substitute for beer, whiskey, and wine. A factory in Buffalo, New York, offered the first designated midmorning and mid afternoon work stoppage in 1902. A half century later, the creation of the term *coffee break* from a Pan-American Coffee Bureau advertisement validated a minimeal dating to fifteenth-century Constantinople. Factories and offices complied with the trend by providing coffee vending machines and coffeemakers in canteens and cafeterias. The relaxation from labor

figured in union negotiations of worker benefits, in combat, and even in the daily food intake of astronauts aboard the space shuttle. Computer operators identify improved eye-hand coordination, reasoning power, and visual acuity from a single cup of coffee.

Currently, coffee plantations thrive on the bean belt, the growing area between the Tropic of Cancer and the Tropic of Capricorn. The most common bean, arabica coffee, suits the taste of 70 percent of aficionados, more than twice the number of those who prefer bitter robusta (*Coffea canephora*). The latter is a high-caffeine, high-yield species discovered in central Africa in 1895 and grown in Brazil, India, Indonesia, and Vietnam. The major roasters of coffee, Philip Morris, Procter & Gamble, Nestlé, and Sara Lee, thrive on the profits from pure arabica and blends.

Coffee Time, Starbucks, Torrefazione Italia, and other chain coffee shops flourish at serving gourmet flavors, which vary the diluted American version with additions of chocolate syrup, condensed or fresh milk, cream, dry foam, half-and-half, ice, or whipped cream. Europeans favor espresso, a concentrated brew that forces pressurized hot water through a fine grind of dark roast beans. Additional flavorings—almond extract, brandy, brown sugar, cocoa, grappa, Irish whiskey, kirsch, lime or orange peel, mint syrup, and vanilla—add sweetness, alcohol, and fragrance.

See also: Adulterated Food; Freeze-Drying; Plant Disease and Prevention; Restaurants; South American Diet and Cuisine; Tea.

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[Columbus, Christopher \(ca. 1451-1506\)](#)

The landing of Christopher Columbus, a Genoan navigator representing the Spanish Crown, on the Bahamian island of San Salvador in the West Indies on October 12, 1492, produced the high-water mark of global food exchange and dietary diversification.

Born to a wool weaver, Columbus went to sea in 1461. He worked on trading vessels across the Mediterranean and as far north as the British Isles and Iceland and south along the Guinea Coast of Africa. In 1479, he settled at Lisbon, Portugal. Columbus formulated an investment venture to propose to John II of Portugal and Henry VII of England. Rejected in both courts and in Genoa and Venice, he returned to Iberia to seek funding. At the court of Ferdinand II and Isabella I of Castile in May 1486, Columbus exploited the national fever for colonization. After initially spurning his idea, the queen kept her options open and changed her mind about investing in potential trade missions to the west.

On August 2, 1492, Columbus set out on the merchant ship *Santa María* on the first of four voyages to the Western Hemisphere. Influencing his expectations, his readings of Aristotle's philosophies prepared him to look for similar food plants in the same global latitudes. A study of *The Travels of Marco Polo* (ca. 1300) raised anticipation of commerce in the Spice Islands, one of the wealthiest food trading sites on the planet. His fleet included the *Niña* and the *Pinta*, which carried crews of 18 each, plus a stock of almonds, anchovies and sardines, beans and lentils, biscuit, chickpeas, flour, honey, molasses, oil, raisins, rice, salt cod and red meat, vinegar, water, and wine. Cooks prepared meals on deck at a single open firebox fueled by logs. On October 2, nearing land, the men caught tuna, a welcome change in the ship's mess.

Landing in the Bahamas on October 12, 1492, Columbus anticipated meeting the Great Khan of China. He viewed flora, such as the papaya and sea grape, that might be useful to Ferdinand and Isabella but regretted that he could not identify

additional plants that supplied curatives, dyes, food, or spices.

Exploring the Bahamas and Cuba

In daybooks, Columbus praised the New World for its fertility and promise of a rewarding enterprise. He lamented that he had no time to ascertain the medicinal powers and nutritional worth of herbs and trees. From foot travel among the Arawak, Carib, Lucayan, and Taíno, he summarized a panoply of taste sensations and reciprocated with gifts of European edibles, usually bread with honey and cups of wine. The Arawak brought popcorn to trade. The Carib made extensive use of the palmetto or cabbage palm as a source of hut materials and of nuts and hearts of palm, a fibrous vegetable. In exchange for tender palm cores, Columbus offered the Spanish onion, a much larger allium bulb than native wild onions.

On October 16 at the island he named Fernandina (present-day Long Island), Columbus observed native corn and kidney beans in the fields. After two crewmen brought him corn flour, the first eaten by a European, he found it tasty. Three days later at Guanahani (San Salvador in the Lucayan Archipelago), he ate iguana, which he compared to the taste of chicken. At Cape Isleo, he collected a half ton (454 kilograms) of aloe, which he honored in his journal with grapes, olives, and wheat as the four vegetables indispensable to human wellness.

Farther west, Columbus misidentified the island of Cuba as mainland China. On October 28, 1492, he encountered the potato, which reminded him of the taste of chestnuts. He identified amaranth and purslane as edible but, on November 16, disdained a meal of huge “snails,” which may have been conches that the Bahamian Taíno valued. For the first time in European history, he observed the recreational smoking of tobacco, the same leaf that the Taíno offered as a gift. He examined specimens of mastic, an aromatic tree resin he believed cured cholera, but he rejected a spice his men collected from the canella tree and misidentified as cinnamon. His food sampling included corn, green beans, kidney beans, manioc bread, and sweet potatoes. Rather than examine them objectively, he contrasted the new flavors and textures to what he had known in Europe.

Hospitality on Hispaniola

In December 1492, the Castilians reached the island of Hispaniola (Haiti and the Dominican Republic), which earned the title “Cradle of the Americas.” On December 16, Columbus declared the environment as desirable a source of provisions as anyone could want. He entertained Guacanagarí, an Arawak cacique, with European food and offered a flask of orange flower water, a substance and fragrance unknown in the West Indies. At Guacanagarí’s royal compound (at present-day En Bas Saline), east of Cap Haitien, Columbus learned how the Taíno made bread by grating manioc root and kneading the pulp into flatbread. The natives fed his crew well on bread, fish, shrimp, yams, and spiced drinks. The day after Christmas, the Taíno of the area where Columbus established La Nueva Isabela (Santo Domingo) in 1496 offered Columbus *ají*, their favorite red chili pepper or cayenne. He called it pimiento and planned to deliver peppers to Spain by the shipload.

Columbus had mixed luck at farming experiments. Near Cap Haitien on December 24, he stationed 39 sailors at Villa de la Navidad, the first European colony in the Americas, to plant European crops. Rather than adapt to the island flora, his men tried to produce crops new to the hemisphere, such as citron, lemon, lime, and orange trees. Meanwhile, their imported supplies rotted in the tropical humidity, which also encouraged the mosquitoes that spread malaria and yellow fever. The attempt to coerce nature wearied the settlers with constant shortages and famine while endangering the island’s ecosystem. On January 1, 1493, sailors took a shore boat to the island of Amiga and collected rhubarb to introduce to Castilian farmers. The root proved to have no commercial value.

On March 4, 1493, Columbus returned aboard the *Niña* to the Seville court of Ferdinand and Isabella. In lieu of gold, the voyager presented to the court new foods, parakeets, and six members of an unidentified New World tribe, whom he called “Indians.” His discoveries broadened European cuisine almost immediately by introducing chili peppers and sweet potatoes to a bland Continental cuisine dominated by beans and peas, bread, cabbage, cheese, mutton, and salted herring and pork. He began planning his next voyage to the land of wonders.

The Columbian Exchange

Setting sail from Cadiz on September 24, 1493, aboard the *María Galante* with a 17-ship fleet, Columbus added four pairs of live pigs to his ship's stores, as well as cattle, chickens, dogs, goats, horses, sheep, and sugarcane for introduction to foreign shores. He crossed the Atlantic to more food discoveries at numerous landfalls in Hispaniola.

One crew member, Michele da Cuneo, wrote of the expansive oyster beds and of the sailors' collection of six boatloads of oysters, none of which produced a pearl. Other sources of West Indian meals, such as fish, pigeons, snakes, and turtles, delighted Cuneo. From European livestock, islanders acquired not only riding horses and new sources of meat, but also butter, cheese, cream, and milk.

On November 3 at the island of Marie-Galante in the Antilles, which Columbus named Santa Maria la Galante after his flagship, Castilian sailors burned their tongues on the poisonous manchineel fruit (*Hippomane mancinella*). At Barbuda, Columbus tasted a sweet fruit, probably a guava or papaya. At Guadeloupe, he enjoyed pineapple, which islanders made into wine and used as an abortifacient and vermifuge. On November 22 on Hispaniola the crew ate monkey meat and observed Indians feasting on lizards and snakes. When Antonio de Torres arrived from Spain with relief supplies in winter 1494, the explorers rallied to supplies of food, medicines, and wine.

Permanent Change

As European agrarianism took hold in the Caribbean, clear-cutting, heavy plowing, monoculture, and soil compacting replaced the land-friendly Taíno system of the digging stick and hoe for growing a variety of vegetables in small plots. The Indians applied an energy efficient system of planting beans to grow up mounded corn stalks and squash as a ground cover underneath. For animal protein, they respected seasonal limits by fishing with wooden weirs and used game surrounds to drive big mammals toward hunters.

By respecting finite nature, the Taíno had avoided overkill of a single species. But the abrupt alteration of the island ecosystem now caused unforeseen damage. Herd animals introduced by the Spaniards rapidly depleted native Haitian grasses and denuded pastures, causing island soil to thin from rain and wind erosion.

Extraneous wild plants—the daisy, dandelion, and nettle—displaced indigenous herbs. The introduction of sources for red

Recipe: Original Jamaican Jerk Snapper

Halve a 2-pound snapper. Rub with a slurry of two chopped hot peppers (*habañero* or Scotch bonnet), two sprigs of thyme, 2 tablespoons of allspice, 1/4 cup of vinegar, and cayenne pepper and sea salt to taste. Place snapper halves on a grill and cook for 15 minutes on each side while continuing to coat the fish with the slurry.

meat, the staple of the Castilian elite, generated a social stratification that made the Taíno dependent on their conquerors.

Like his crew member Cuneo, Columbus showed ongoing concern for matters of hunger and food. He attempted an exchange on Hispaniola, where he introduced seeds of cucumber, melon, squash, and radish. His experimental agriculture failed to grow barley, beans, chickpeas, lettuce, onions, and scallions. He pioneered the planting of wheat, the first grown in the Western Hemisphere, which his colony needed for malting and livestock forage. In Jamaica, he discovered allspice, a source of oil and an essential of the Arawaks' jerked (spiced) meat for its mingling of aroma and flavor reminiscent of cinnamon, clove, and nutmeg. On April 2, 1494, at Santo Tomás (St. Thomas), he introduced European food technology by building a gristmill.

The second voyage continued to surprise and inform Columbus. In Cuba, he ate fish and *hutias*, rodents served in a peppered stew. Diego Álvarez Chanca, his physician and fellow enthusiast for discovery, identified red pepper as a member of the capsicum family. Chanca claimed that produce on Hispaniola grew 2.5 times faster than its Spanish counterpart.

The homeward journey began from Hispaniola on August 20, 1494. Columbus's survey of the Azores, Canaries, and Cape Verde Islands implanted an insight into the ecological disaster to come from the stripping of forest canopies and introducing European agricultural theory to virgin tropical soil. More dire for the Taíno, their numbers fell rapidly from European diseases and enforced labor

in sugarcane fields and mines.

Further Exploration

On the third expedition, embarking on May 30, 1498, Columbus led six ships from Spain to Trinidad in two months. He explored Venezuela, the Orinoco River, Tobago, and Grenada. On August 6, he offered gifts of beads, brass bells, and sugar to Carib traders who approached his fleet in a canoe. The natives presented Columbus with bread, corn, fruit drinks, and beer made from corn. South of Trinidad, the mainland, which the Caribs called Paria, flourished with wild grapes and orchards. The chief welcomed Columbus and his men with feasting and gifts of parrots and pearls. The voyage taxed the navigator with fever and gout as well as an eye inflammation that rendered him nearly blind.

For the fourth and final voyage, Columbus covered the sea route between Cadiz and the Antilles in 35 days, arriving at Martinique on June 15, 1502. He visited Jamaica before exploring the coast of Honduras, Nicaragua, Costa Rica, the Cayman Islands, and the Darién peninsula of Panama, the home of more advanced peoples than the Arawak and Carib of Haiti. At Guanaja Island off Honduras on July 30, his brother, Bartolomew Columbus, encountered 25 Maya in a trading dugout. The Indians carried cacao beans, which they used as currency, but the Castilians, bent on finding gold, were unimpressed. On August 18 at an area in Honduras he named Costa de la Oreja, Columbus feasted on chicken, bread, red and white beans, and roast fish. Into early fall, he explored the coast of Nicaragua. On the Mosquito Coast, he sampled bananas, coconuts, and a luscious fruit he misidentified as *myrobalan*.

At Jamaica on July 7, 1503, Columbus made another culinary discovery, a wild turkey with feathers he described as woolly. During a year stranded among the Taíno, he cajoled them into supplying his men with food by predicting the lunar eclipse of February 29, 1504. On November 7, 1504, he arrived back in Spain with details of barbecuing, the first chocolate seen in Europe, and samples of chili pepper and Jamaican allspice, substitutes for cinnamon, clove, and peppercorns.

Ironically, although Columbus introduced the roots of the world's future commercial wealth, he parried complaints from investors that his expeditions had

returned little profit, especially lacking pearls and precious ores. Men of little vision overlooked the Columbian exchange, which brought tobacco and the wild turkey to Europe. A treasury of foodstuffs and cuisine additives eventually flowed from the New World—avocados, blueberries, butter beans, cashews, chicle, cranberries, gooseberries, green beans, Jerusalem artichokes, kidney and lima beans, maple syrup, muscadines, passion fruit, peanuts, pecans, sarsaparilla, and vanilla.

By the mid-1500s, Spanish agronomists had planted European produce in Columbia, Mexico, Peru, the Philippines, Puerto Rico, Venezuela, and the West Indies. The Antilles acquired cauliflower, citrus groves, figs, lettuce, and pomegranates, new food crops that increased food choices and nutrition in the Caribbean. From the Spanish toehold in the Philippines, trade took chocolate to China and added to sophisticated European tables more types of Chinese fruit, rice, and spice than gourmands had ever seen.

Boosting the cost of exotic goods, the water–land-water transport from the Philippines to Acapulco and from Veracruz to Spain endangered costly stores from seawater, salt air, and attrition. Nonetheless, the arrival of green beans, potatoes, and tomatoes generated a boom in truck gardening and farmer’s markets. The olive flourished in Peru. The French embraced haricots verts (green beans); Italian innovators, wearied of the pulse-based cuisine of the ancient Romans, turned tomatoes into sauce for pasta and pizza and found use for the New World zucchini. Corn generated new plantings and food traditions in Lombardy and Romania. In England and Ireland, the American potato became the basis of mashed potatoes and shepherd’s pie.

See also: Agriculture; Amerindian Diet; Barbecue; Jerky; Manioc; Maritime Trade Routes; New World Commodities; Peppers; Pickling; Potatoes; Sauces and Saucing.

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Commodity Regulation

Because most nations import and export edibles, the guarantee of wholesome, clearly labeled edibles relies on laws that require global oversight of quality, correct measures, and sanitation. Commodity regulation deals in the specifics of dairy foods, fruits, grains, meats, seafood, vegetables, and water. Prescripts are as old as the Mosaic code and as current as directives from the European Union, United Nations, and World Health Organization on genetic modification.

After 3000 B.C.E., Egyptian priests restricted the sale of meat to healthy, unblemished animals slaughtered in plain sight according to market ordinance. In the 1600s B.C.E., Sumerian King Hammurabi II regulated dairy commerce as stringently as he did butchering. From as early as 850 B.C.E. through the Talmudic period ending in 500 C.E., Hebrew market agents in Palestine attached clay inspection labels to oil and wine amphorae stating date of filling and the identity of the bonded ware house. Among Athenians, wine inspectors handed out fines and penalties for food hoaxers. Strict temple ordinances controlled the age and condition of a sacrificial beast or bird and its slaughter and cooking and distribution of altar portions.

From 439 B.C.E., Roman civil law abandoned the arbitrary legal principle of caveat emptor (let the buyer beware) by necessitating accurate labels and weights and measures. After 388 B.C.E., aediles elected to the office of public works supervised fresh and smoked meats and grain and provision markets as well as the water supply from aqueducts and fountains. Agents oversaw meat curing with statutes that protected the consumer from fraud, such as the substitution of

goat meat for more appealing ingredients. Nevertheless, smugglers avoided the price jumps and tariffs inflicted by regulators and maintained thieves' markets, unmonitored exchanges where peasants bought and sold under an illicit economy.

The Lex Fannia, legislation sponsored by Consul Caius Fannius Strabo in 161 B.C.E., regulated the amount citizens could spend on fish and meat and on the weight of silverware at table. Under Augustus, the first emperor, sumptuary laws restricted *luxuria* (extravagances), particularly commerce in Asian imports. Austerity imposed a return to early Roman values instituted by a pastoral culture, a means of upholding the virtues of simple country beans, pork, and spelt that the mythographer Ovid urged in *Fasti* (*Holidays*, 8 C.E.).

Surveillance increased suspicion of the edibility and safety of imported goods and foreign sauces that marketers hawked in a cosmopolitan city. At a peak in imperial fortunes in 324 C.E., the Roman Emperor Constantine proclaimed Constantinopolis the alternate capital of his realm. Officials regulated grain and meat commerce and set standards on fish from some 1,600 trawlers per day.

Early Modern Regulation

Health regulations got their start in the Middle Ages with consumer edicts governing the safety of beer, bread, cheese, eggs, sausage, and wine. Along the network of old Roman roads, collaboration among ale houses and coaching inns regulated the dispensing of brewed and fermented beverages. Kosher house wives patronized a network of abattoirs, bakeries, delis, fish markets, picklers, and wineries that observed rabbinic strictures. They chose merchants governed by respect for scriptural food and sanitation edicts. Similarly, under Islamic law, the governance of commodity exchange fell to clerics rather than state bureaucrats.

In 732 C.E., in response to Germanic paganism, Pope Gregory III issued a ban to St. Boniface, a missionary to Germany, on the eating of horses, which the church valued as companions and as mounts for cavalry under assault by an Islamic army. Under Pope Zachary I after 741, Boniface extended commodity regulation to the eating of uncooked bacon and pork and the consumption of meat from animals killed by accident, disease, or starvation. These codes illustrated the

centrality of the meat diet and the economic value of the meat industry to the Holy Roman Empire, which eventually came under control of the Mecklenburg city bailiff and the thirteenth-century butchers' guild at Augsburg and Basel.

In 1215, King John's signing of the Magna Carta returned to Roman concern for getting one's money's worth by codifying England's statutes governing weights and measures. Common law and guild principles protected the consumer from rancid meat, rotted cheese, and deliberate commodity adulteration of aromatics and condiments. The Pepperers Guild outlined deceptive practices in the packaging and sale of spices, especially the most expensive—alum, cloves, ginger, pepper, and saffron. Agents combated false claims of freshness and quality in fish and milk. In 1266, the Assize of Bread set loaf ingredients and proportions of flour per pound of bread, as overseen by justices of the peace. In 1291, French statutes forbade the concealment of original wine casks, the mixing of two wines, and the marketing of vintages by false names or ages.

German commodity law tended to punish falsifiers with brutal executions. In Augsburg, bakers and their employees using unwholesome flour or short-weighting loaves underwent a lethal ducking in a muddy pond. Nuremberg regulators terrified food adulterers by public immolation. In 1444, the state incinerated a food cheat by burning him with his adulterated saffron. At Biebrich, Hesse, in 1482, a wine falsifier had to swallow 1.5 gallons (5.7 liters) of adulterated wine in a few minutes, a sure death sentence.

In 1540, English law empowered physicians to search and analyze the quality and cleanliness of foodstuffs and spices dispensed by apothecaries and to destroy offensive stock. After 1558, Elizabeth I fought such faulty commodities by proclaiming a purity act in 1580 that required bona fide labeling of honey with a hot iron inscribed with the seller's initials. Those selling counterfeit produce risked a penalty of 6 shillings 8 pence. The following year, similar stringent regulations forbade the contamination of wax with resin, tallow, or turpentine. James I standardized medicinal dosages in April 1618 by issuing the *Pharmacopoeia Londinensis*, which prescribed the dispensing of spices and chemicals. The decree represented a larger program of regulating foreign and home commerce in corn, pepper, and other edible commodities in standard measures and weights. The British Adulteration of Tea and Coffee Act of 1724 further standardized luxury purchases.

New World Regulations

North American food inspection lagged behind that of its European counterparts. During the Civil War, President Abraham Lincoln signed the False Claims Act of 1863 prohibiting profiteering from the U.S. government by making deceptive or false claims, such as the ingredients of pharmaceuticals and processed foods, particularly biscuit, coffee, and portable soup, three major purchases of the Army of the Potomac. In the 1870s, Grange members, led by Oliver Hudson Kelley, a staff member of the U.S. Department of Agriculture, protected grain and forage farmers by promoting Granger laws in Illinois, Iowa, Minnesota, and Wisconsin. The legislation fought corrupt middlemen by superintending the sanitation of cooperative silos, grain elevators, rail transportation facilities, stockyards, and warehousing.

Meanwhile, meat marketing allowed unscrupulous license. Consumers in Austria, England, France, Germany, and Italy campaigned against unfit salt pork. In 1879, prohibitions against the sale of one U.S. commodity—bacon—reduced the export of trichina in swine products. The U.S. Congress passed inspection regulations in 1890 that guaranteed the quality of bacon and salt pork. Within months, Chicago opened a food laboratory conducting microscopic inspection of pork for trichina. In 1895, federal law empowered regulators to destroy condemned meat. Canadian law followed the U.S. example.

Twentieth Century and Beyond

The U.S. Pure Food and Drug Act of June 10, 1906, called for the creation of the Food and Drug Administration (FDA), the nation's oldest consumer protection agency and main commodities regulator. After Upton Sinclair's muckraking novel *The Jungle* (1906) disclosed corruption in the meatpacking industry, President Theodore Roosevelt championed the Meat Inspection Act of June 30, 1906. The first law prohibiting adulterating and misbranding meat from cattle, goats, horses, sheep, and swine, the legislation began a crusade for sanitary abattoirs and processing plants. Technology upgraded U.S. merchant marine fleets under the Shipping Act of 1916, which applied stringent rules to food

shipments by Great Lakes and oceangoing barges and merchant vessels.

The onset of World War I required new edicts establishing fairness to buyer and trader and ensuring minimum waste of foodstuffs during global combat. In England, fixed ingredients and prices for flour, grain, milk, sugar, and tea restricted profiteering and discouraged food swindles. Scofflaws risked a fine of £100 and six months at hard labor.

The highway system, port inspections, and supermarkets improved food quality for suburban shopping. The 1938 Federal Food, Drug, and Cosmetic Act (or Wiley Act) fought medical quackery, pesticide residue, food adulterants and dyes, and deliberate misbranding by replacing widely varying state regulations with a firm national standard of purity. Scrutiny of food handling and distribution increased with the addition of standards and frequent spot inspections, especially of imported prepackaged fish, meats, and tea from Argentina, China, Japan, and New Zealand. In 1949, Arnold J. Lehman, the “Father of American Toxicology,” equipped the FDA with a guidebook, “Procedures for the Appraisal of the Toxicity of Chemicals in Food,” a manual that initiated government oversight of processed food.

The past decades have produced consistency in global commodities standards. On January 1, 1958, the Food Additives Amendment identified 700 safe food substances. The Delaney Clause banned such carcinogens as cyclamate and lead and halogenated compounds. Throughout Europe since the 1970s, criteria for ingredients in commercial foods insisted on uniform, identifiable plant varieties rather than wild insect- and wind-pollinated plants. In defiance of agrarian regulation of traditional foodstuffs, botanists have established heirloom arboretums and seed banks.

U.S. consumer agencies increased health warnings, resulting in 1983 with the Federal Anti-Tampering Act and in 1986 with a ban on Alar, a growth regulation spray for apples. Further surveillance of food colorants and flavorings scrutinized additives to baby food. In 1990, the Nutritional Labeling and Education Act required full disclosure of food ingredients by proportion.

In January 2001, Dole Food Company, the world’s largest fruit and vegetable seller, entered organic marketing by distributing bananas grown without bioengineering or chemical enhancements. The firm’s advance into a limited specialties market coincided with issuance of the first national organic food

standards by the U.S. Department of Agriculture, which regulates produce nationwide, beginning in August 2002. U.S. border rejections of African foods tended toward the ridding of cereals, dried fruit, nuts, and vegetables of foreign matter and microbes. In 2011, health and purity ordinances passed by the European Union increased overhead, notably the cost of analyzing and inspecting seafood, maintaining quality control, removing pesticide residues, and tracing aflatoxins.

See also: Endangered Species; Genetically Modified Food; Heirloom Plants; Organic Foods; Rationing; Taboos, Food; Trading Vessels.

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Commodity Riots

A dynamic of the struggle for property and power, rioting against food profiteers and commodity hoarders tends to follow harvest failures, inflation, and war time price-fixing and rationing. Examples during the American Revolution of 1776, the French Revolution of July 1789, and the fall of the Romanov dynasty in Russia in 1917 illustrate the power of starvation and inflated prices to arouse nationalism and bring down governments. With food as a symbol of social inparity, the underclass uses child malnutrition as justification for coercing and disempowering the privileged class.

During subsistence emergencies throughout the Roman Empire for two centuries following the mid-300s C.E., the plebeian class of Alexandria, Antioch, Constantinople, and Thessalonica as well as Rome faced periods of famine while aristocrats flourished. Urban security decreased while mendicants and petty criminals overran marketplaces and plotters plundered granaries and burned property. Mobs demanded a bread dole from grain shipped to the ware houses at Ostia from Egypt and Sicily. At the imperial capital, the senatorial class had little choice but to distribute flour, oil, pork, and wine in the Suburra, southwestern Rome's ghetto. In 100 C.E., satirist Juvenal predicted the class impasse with the term *panem et circenses* (bread and circuses), a snide comment on shallow politicians who chose short-term appeasement of recurrent crises.

Opposing Commercialization

The decline of European feudalism created additional agitation among the needy. The rise of a market economy angered peasants, who had previously enjoyed prices adjusted to their means by aristocratic paternalism. In Tudor England, fury emerged in the artisanal class between 1585 and 1603, when the war against the Spanish Armada and the Nine Years' War fixed prices and diverted provisions to the military. On November 17, 1596, a failed harvest and mounting poverty triggered revolt in Oxfordshire against commercialization of the food supply. To set an example, Elizabeth I had two ringleaders hanged, drawn, and quartered but, in 1597, she relented in her anger toward the destitute by passing the Act for the Relief of the Poor.

A parallel revolt against food commercialization in China during the Ming dynasty resulted from the growth of cities and the demand for bread. Peasants raged against the transport of harvests to urban areas and for trade with the Dutch, Portuguese, and Spanish. During the reign of Emperor Wanli, the riots began with roadblocks, which occurred in Shanxi in 1583 and Jiangxi in 1588. Thousands of the rural poor confronted grain factors to prevent hoarding by speculators. To draw attention to the rebellion, leaders banged gongs and floated banners before seizing the grain for free distribution or for sale by local dealers at a reasonable rate.

In 1594, food insecurity in Fuzhou compelled infantryman Deng San to fight back against profiteers who defied caps on the price of rice. He led a throng to the home of Li San, the obdurate rice factor, for looting and intimidation. After three days of lawlessness, militia ended the riot. A more serious insurrection on April 12, 1620, aroused 10,000 Suzhou rioters against wealthy grain merchants. For ten days, rebels sacked and burned the houses of the rich and closed the market.

In England, bread insurrections took unpredictable turns, such as the lifting of a symbolic loaf with a pitchfork and the tying of expensive loaves in black ribbon, the acts of canny instigators. Passage of the Riot Act on August 1, 1714, had little effect on food protests, whether premeditated or spontaneous. In September 1766, lace makers in Honiton removed corn from rural barns to alleviate shortages. The throng marketed the grain and returned cash and corn sacks to the growers. At Nottingham on October 2, 1766, a rally at the Goose Fair protested the removal of 6,000 cheeses by Lincolnshire traders. A three-day disturbance had cheese wheels rolling through Peck Lane and Wheeler Gate, knocking the mayor into the mud.

Foot rioting originated legends about the motivation of local unrest. At Halifax on August 16, 1783, the hanging of rabble-rouser Thomas Spencer, a leader of revolt against grain prices, resulted in his martyrdom by fellow rioters for his seizing corn and wheat from wagons and warehouses. A meat protest at Market Place in Nottingham on May 12, 1788, intimidated the village butcher. The confrontation resulted in a bonfire being made from the butcher's records, doors, and shutters, a gesture of contempt for his low-quality goods. On the anniversary of the riot in 1792, when meat prices rose again, townspeople restaged the rampage.

Riot Tactics

Near the end of the eighteenth century, dissent strategy called for the interception of food in transit and at piers and loading docks. Preceding demonstrations, runners distributed handbills denouncing exploitation of the poor. In England in 1795, female shoppers engineered a nonviolent food riot by advancing on bakeshops, proffering a reasonable amount of money for their

purchases, and departing with the overpriced goods. The food demands and grocer coercion continued into the early 1800s, when Napoleon's blockades kept supply vessels from reaching England.

Food scarcity, currency deflation, and unprecedented inflation and taxation during the American Civil War forced Southerners to demand food relief. In the first half of the four-year conflict, baking needs rose 200 percent in cost; dairy goods quadrupled in price. The redirection of salt to military use deprived civilians, prohibiting them from preserving precious meat. Rebellion arose in Atlanta, Augusta, Columbus, Macon, Milledgeville, and Savannah, Georgia. Clashes with price gougers and speculators resulted in pilfering of flour, meal, and salt barrels and sacks of bacon, dried beans, and peas. House wives snatched what they could carry from ware houses and load into wagons.

To enforce government cost controls, women in Salisbury, North Carolina, on March 18, 1863, wielded axes and hatchets and forced dealers to open stores. A month later, Governor Zebulon B. Vance urged mobs to leave law enforcement to appointed agents. An autumn flour rebellion in Mobile, Alabama, on September 4 of that year, sent women raging into dry goods emporiums on Dauphin Street. According to an October issue of the *Country Gentleman*, agitators waved placards reading "Bread or Peace" and "Food or Death." Militia brandished bayonets against females armed only with fists. A year later, the situation worsened with the rising price of stove wood and the rationing of sugar and molasses.

In another episode in 1864, women from the Belvidere Hill Baptist Church in Richmond, Virginia, followed mob leader Mary Jackson on a rampage at Capital Square. Wielding cleavers, hatchets, and pistols against shop keepers, raiders raged for two hours until Governor John Letcher intervened. At the order of Confederate President Jefferson Davis, public authorities dispersed the crowd with threats of firing on mobs. The food rioters faced 16 counts of misdemeanor larceny and a felony charge against Jackson for fomenting a riot. To prevent future food riots, the state police placed cannon in range of supply depots and calmed outraged women with rations of rice.

Public frenzy continued to dot periods of food insecurity in the United States. In 1902, riots in New York City's Lower East Side revealed the exasperation of mothers, who led militant males in politicizing everyday dealings with the kosher

butcher. High prices so incensed Jewish homemakers that they trampled meat in the streets and collared bystanders who refused to take part.

During World War I, American shoppers waited in mile-long lines for bread. Consumers charged bakeshop owners for adulterating wheat flour with barley, oats, and rye to stretch supplies and augment profits. On February 20, 1917, women rallied against the inflationary cost of chicken, fish, onions, and potatoes by confronting the pushcart vendors of New York City. Their march to City Hall to press for food relief spread to consumers in Boston, Chicago, Philadelphia, and Toronto.

Contemporary World Uprisings

Capricious changes in food availability and pricing continued to spark antigovernment forays across the globe. On January 17, 1977, spontaneous revolt from Alexandria to Aswan, Egypt, followed President Anwar Sadat's cancellation of \$250 million in state food subsidies on flour, oil, and rice. A clash between millions of the destitute and the middle class raged for 48 hours. Despite the dispatch of military squads to rout the mob, 79 citizens died and 800 required medical treatment. The virulence of the hungry forced Sadat to restore previous food policies.

Between 2004 and 2011, as investment lapsed and food stockpiles dwindled worldwide, food prices doubled. In late 2007, with 33 nations at risk of social mutiny against food crises, clashes erupted in Bangladesh, Bolivia, Mauritania, Mexico, Morocco, Pakistan, South Africa, Sri Lanka, Uzbekistan, and Yemen. On February 22, 2008, urbanites in Burkina Faso rebelled against price increases of 65 percent. To calm citizens, the government removed tariffs and taxes on dairy goods, infant food, oil, rice, salt, and wheat and distributed free meals at hospitals and schools.

Riot forces in Ivory Coast on March 31, 2008, fired tear gas at market protesters, who protested the rise in beef costs of nearly 25 percent. A similar emergency response in Cameroon denounced import duties on fish, flour, and rice. Bread shortages in Egypt the following April 8 provoked demonstrations in which police shot a child in the head. In the same week, the 50 percent boost in

costs of beans, condensed milk, fruit, and rice in Haiti sent dissenters into the street to revile Prime Minister Jacques-Édouard Alexis.

Spring 2008 exposed to the world media a growing outcry against hunger. Southern Yemenites resorted to arson and roadblocks against army tanks. In Dakar, Senegal, food rioters claimed that police tortured protesters of inflation. Egyptian families stood in queues from dawn to buy *baladi*, the nation's staple flatbread. In protest of uneven commodity distribution, arsonists in Mahalla burned tires on railroad tracks and set fire to two schools. Black marketers increased tensions by charging \$377 for 220 pounds (100 kilograms) of flour worth \$3.14.

Turmoil in North Africa worsened in summer 2011, when global food prices reached a record high. Jordanians opposed the cost of staples; Libyan impatience with grocery pricing reached a boiling point. Additional uprisings threatened commercial districts in Chile, Morocco, and Mozambique. Mobs in Algeria and Tunisia challenged police in street battles. The scramble for food resulted in the death of 100 citizens and the destabilization of both governments.

See also: Proust, Joseph-Louis; Rationing; Salt.

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Condiments

The complementary taste and smell of liquid and semiliquid condiments, pickles, and flavoring sauces can make or break an entrée. National and regional favorites depend on small quantities of savor or sweetness, as with French onion dip on

chips, horse radish on beef, ketchup or mayonnaise on fries, molasses on biscuits, red currant jelly on lamb, and whipped cream on pecan pie. Some additives, including duck sauce atop spring rolls, miso and *shoyu* (soy sauce) with Japanese rice dishes, *sofrito* on Haitian cod, and vinegar in Caribbean callaloo, ensure authenticity in ethnic cuisine. Menus retain the traditional pairings of Irish lamb with mint sauce, pork loin with applesauce, tartar sauce on fried flounder, toast with anchovy paste, and wasabi on sushi.

Fish roe, honey, pepper, rue, salt, seaweed, and vinegar figure in the earliest recorded recipes as seasonings and digestive aids. In 5000 B.C.E., Egyptians and Hebrews valued cinnamon oil as a cordial, coriander and cumin as aromatics, dill and honey as dressings for altar gifts, and the hot bite of horse radish and capers grated over meat as an appetite stimulant. Mustard intensified the first curry powder, which occupants of Mohenjo Daro in the Indus Valley in 4000 B.C.E. husked and winnowed before pounding the seed in mortars. Chinese cooks introduced fermented soy sauce around 2800 B.C.E. as a food accessory. The Romans turned honey and vinegar into complementary pantry staples and factory-made *garum* and *liquamen* (both fish sauces) into major exports for embellishing porridge.

Medieval Advances

After a decline in condiment demand, early medieval chefs experimented with creamy bread sauce, tartar sauce, and verjuice squeezed from unripe grapes to intensify dishes for the wealthy. Condiments traveled well, as exemplified by the mustard paste ferried north to the Celts by Roman legionaries. Horseradish enlivened the cold meats and spreads of Britons, Germans, and Scandinavians. Central European Jews favored horse radish to serve with gefilte fish and to treat sinus and urinary infections.

Monastery cooks made *cameline* from cinnamon in vinegar, *caudell* from ale and egg yolk, *galantyne* from jellied meat drippings, and *poivre jaunet et noir* from green and black pepper. In the 800s, French monks turned mustard into a moneymaking flavoring, which hawkers sold on Paris streets. *Coulis*, a puree of orchard fruit or vegetables, sometimes incorporated roast meat drippings or the

flesh of crustaceans and fish.

To medieval Islamic platters, cooks applied dabs of *murri* (fermented barley) and olive oil, a foodstuff too expensive as a general ingredient. A cheesy condiment, *khamakh rijal* involved the placement of milk in a gourd to ripen for three months before the addition of garlic, mint, nigella, and rose leaves. With a distinctive taste, *amba*, a pickle common to Iraqi cooking, flavored mango with fenugreek, mustard, and turmeric to spread on pita sandwiches.

Post-Columbian Flavor Boom

The introduction of Christopher Columbus's crew to barbecue in Hispaniola in 1492 informed Europeans of the savory sauce accompanying wood-smoked pork and poultry. The blend of spice and sweetener with tomato and vinegar soaked into the dish and heightened aroma while tenderizing the meat. A similar union of *chimichurri* with *asado*, the barbecue of Argentina, Brazil, Chile, Colombia, Nicaragua, Paraguay, and Uruguay, created a titillating main dish. An oily combination of garlic, lemon, onion, parsley, pepper, and salt, chimichurri served as both condiment and marinade in the same way that the Chinese used hoisin sauce as a specialty dip and glaze for beef and poultry.

In the early Renaissance, chefs turned condiment making into a profession, beginning with the purchase of almond powder and sugar from pharmacists. Processing of condiments grew so contentious that, around 1550, governments cracked down on adulteration and contamination, particularly the addition of coal-tar dye and pumpkin to ketchup. The Genoans updated Roman *moretum* (cheese spread) into pesto sauce, a creaming of basil, garlic, and pine nuts with olive oil and grated cheese; Scots creamed peas into mushy peas as a dressing for cod and salmon and condiment with steak pie. In *Le Grand Cuisinier (The Elegant Cook, 1583)*, an anonymous recipe for Barbe Robert sauce suggests the combination of fried onions, mustard, verjuice, and vinegar for topping duck, eggs, fried fish, and roast hare. Consumers in Tudor England equated such quality saucing with the best in dining.

In the 1600s, the French brought Continental cooking to a historic height. Chefs produced *chasseur*, Lyonnaise, Mornay, and port, all variations of white

sauce. Credited to Philippe de Mornay, these four contributed zest to seventeenth-century meats and vegetables. Chasseur, a brown sauce made from mushrooms and shallots in wine, topped game and pheasants. A fifth period favorite, béchamel, invented by Louis de Béchamel, head steward to Louis XIV, or by the king's chief chef, Pierre La Varenne, flavored dried cod.

English mustard makers had a monopoly on manufacture by 1658 and formed a professional guild. During this same period, British colonial cooks adopted chutney, saffron, and turmeric from Indian table garnishes. When voyagers returned from the Far East, they described the appeal of soy sauce. Lacking soybeans, food processors imitated the taste with kidney beans and mushrooms and added their wares to hash, ragout, and soup. Royalist food writer Robert May's *The Accomplisht Cook; or, The Art and Mystery of Cookery* (1660), a survey of 1,300 entrées served to the court of Charles II, summarized the influence of French gastronomy during the king's retreat from the Puritan Commonwealth. To celebrate regal alimentary standards during the Restoration, May compiled 13 categories of condiments to accompany meat entrées, including dressings for fricasseed frog's legs and snails and ambergris on nightingale.

In the 1690s, the Chinese bottled the first commercial soy sauce and *kekets iap* (ketchup) from spiced fish pickle or brined shellfish. Within a decade, British explorers introduced both ketchup and soy sauce to Europe. Innovative ketchup recipes included anchovies, cucumbers, gooseberries, herring, kidney beans, liver, mushrooms, oysters, pome fruit, and walnuts as basic ingredients before the early 1800s. Afterward, tomatoes anchored batches, producing a bright flavor and color. From the Regency period into the mid-Victorian age, the rage for ketchup appeared in the writings of Lord Byron, Jane Austen, Charles Dickens, and Rudyard Kipling.



Worcestershire sauce, ketchup, and HP brown sauce— along with mustard, mayonnaise, barbecue sauce, and salsa—are among the most popular condiments in modern Western cuisine. Liquid flavor enhancers are as old and diverse as world cooking itself. (*Business Wire/Getty Images*)

Mayonnaise dates to an exact time, June 29, 1756, the era in which velouté, a cream and egg yolk white sauce, reached perfection. To celebrate a victory over the British, the chef of the duke of Richelieu substituted olive oil for the cream in velouté to emulsify a condiment named “mahonnaise” for Mahon, Minorca. Subsequent concoctions deepened the delicate flavor with lemon juice, pepper, and sea salt.

Mayonnaise became a global condiment, featuring regional alterations in the original recipe. Aioli, a garlicky mayonnaise, originated in Provence as a sauce for fried hake; a variant, rémoulade, added anchovy paste, capers, curry, and pickles to mayonnaise for saucing cold crab, plaice, salmon, and sole. Belgians and Dutch added creamy mayonnaise to dishes of cold chicken and hard-boiled eggs. Russians made mayonnaise the binder in a salad of meat, potatoes, and

vegetables.

Pre-Modern Innovations

The era of experimentation generated more complicated condiments from simple beginnings. An emulsification of clarified butter and egg yolk, Hollandaise garnished steamed asparagus from the 1650s. Hollandaise preceded béarnaise, a condiment invented in 1836 by Jules Colette, the chef at Le Pavillon Henri IV in Paris. The bright yellow cream sauce got its unique flavor from the addition of herbs, nutmeg, peppercorns, shallots, tarragon, and vinegar for topping pike.

The nineteenth century inspired industrialists to manufacture condiments, including creamy horse radish, HP sauce (brown sauce), malt cake, and tomato ketchup. Grist miller Jeremiah Colman of Norwich blended brown and white seeds in 1804 to produce Colman's mustard, a brand name popular with Queen Victoria's house hold. Worcestershire sauce, an anchovy dressing bottled by chemists John Wheeley Lea and William Henry Perrins in 1835 and marketed in 1837, added zip to Caesar salad, oysters, and Welsh rarebit as well as mixed drinks. Cooks in Australia, Canada, China, Indonesia, and Thailand found additional uses for the famed "English sauce." Food inventor Jean Naigeon of Burgundy refined brown mustard in 1856 by replacing vinegar with verjuice. The smooth, pleasant taste appeared in markets as Dijon mustard.

In the United States, moral reformer Sylvester Graham joined temperance activists in denouncing sexual promiscuity and American dietary standards for debauching youth. In 1831, he led a crusade against gastronomic stimulants. Among his targets—coffee, liquor, meat, opium, tea, tobacco—he railed against curry powder, pepper, salt, and spices as anatomical mischief makers. In his *Lectures on the Science of Human Life* (1839), Graham called for a ban on cinnamon, ketchup, and mustard as enervators of the body and precipitators of dyspepsia and exhaustion. A fellow zealot, educator William Andrus Alcott, extended the list to include cucumber, garlic, ginger, gravy, lettuce, pickles, and sauces, which he condemned as licentious drugs and temptations to carnality. By 1840, the ranting over condiments ceased.

Commercial condiments provided convenience and lower prices in the early

1900s but limited diversity and imagination. U.S. industrialist Henry John Heinz profited by shipping 46-gallon (174-liter) tuns of ketchup, America's national sauce, to Australia, Canada, China, Great Britain, Japan, New Zealand, South Africa, and South America. In New York City after 1910, delicatessen worker Nina Hellman marketed Hellman's mayonnaise in glass jars, the forerunner of a ubiquitous product that currently holds 45 percent of U.S. sales in jarred mayonnaise.

Presently, American menus feature condiments by name with entrées, especially balsamic vinegar on baby greens, barbecue with mustard sauce, red pepper on pizza, and turkey with cranberry relish, either jellied or chopped with oranges and walnuts. Shakers of cinnamon sugar complement apple desserts and cocoa; special salts complement popcorn and seafood with bacon, celery, chili, citrus, garlic, and smoke flavors. Hot sauce remains a table standard in Cajun and Tex-Mex cafés and the fish camps of the American South. For dishes such as cheddar fries, nachos, and taco salads, melted cheese, *pico de gallo*, and salsa are more recipe essentials than condiments.

See also: Carême, Marie-Antoine; Chutney; Curry; Grilling; Ketchup; Mustard; Pickling; Roman Diet and Cuisine, Ancient; Salt; Scandinavian Diet and Cuisine; Spices; Sugar and Sweeteners.

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[Consumer Protection Laws](#)

To prevent fraud and unscrupulous practices in the marketplace, consumer protection laws promote competition and honest representation of goods. In the United States, the Food and Drug Administration (FDA), empowered by the Pure Food and Drug Act of 1906, stamps imported bottled water, eggs, meat, and poultry as edible. Consumers trust goods certified free of antimicrobial resistance, cloning, drugs, genetic engineering, irradiation, and pesticides. Examples of infractions include excessive caffeine in bottled cola, mislabeling of genetically modified corn in snack chips, dioxin in fish, expired baked goods, mutton from cloned sheep, irradiated exotic fruits, and dichlorodiphenyltrichloroethane (DDT) on peppers and tomatoes imported from Mexico.

A series of follow-up laws and modifications of standards increased the safety of food and water. The Federal Meat Inspection Act of 1907 shields the public from unsanitary conditions in Chicago abattoirs, tainted egg farms in Iowa, and adulterated cold cuts, ham, potted meat, and sausage in supermarkets. In 1923, strict scrutiny advanced to dairy products to prevent addition of fats and oils as fillers in skim milk. Criminal investigations involved a network of agents from Customs and Border Protection, the Department of Justice, the Federal Bureau of Investigation, and Interpol as well as local and state agencies and the U.S. Coast Guard.

In the European Union (EU), a league of 27 member states, a similar integrated approach to food quality and animal health depends on a farm-to-table supervision by the European Food Safety Authority, impaneled in January 2002. Inspectors select at random from cartons and flats of produce to search for fungicides and herbicides on brussels sprouts, cucumbers, hops, olives, soybeans, and sunflower seeds. Among concerns are residues in honey, aflatoxin in peanuts from Argentina, and carcinogens in Pai You Guo capsules and tea, a fad Chinese weight-loss supplement that causes addiction, fainting, heart palpitations, and insomnia.

Under the Consumer Product Safety Act of 1972, the U.S. Consumer Product Safety Commission sets mandatory standards. Regulation aids industry in developing voluntary quality control and evaluation of transportation by railcar and tanker truck and temperature controls for frozen and refrigerated commodities. The commission can recall or ban from retail marketing and secondhand sale dangerous foods and drugs or equipment, such as suspect

naturopathic elixirs, bodybuilding enhancers, barbecue grills, coffeemakers, and infant feeding devices.

Also in the United States, in 1974, passage of the Safe Drinking Water Act established purity standards for public water systems by curtailing the injection of wastes underground and eliminating lead soldering of plumbing pipes. Inspections of water tanks on commercial aircraft found contents contaminated with *Escherichia coli* (*E. coli*) in 15 percent of planes examined for microbes. In 1996, passage of the Food Quality Protection Act targeted another covert threat, insecticide residues and veterinary medicines in comestibles, particularly those consumed by children.

International regulatory safeguards protect consumers from questionable standards in imported goods. In 2007, a recall of Chinese seafood and toothpaste and subsequent import bans on rice protein adulterated with melamine involved consumer watchdogs in the United States as well as Australia, Canada, the European Union, and New Zealand. On July 10, 2007, the Chinese government executed its food and drug administration chairman, Zheng Xiaoyu, for compromising quality goods by taking bribes. Xiaoyu's corruption of standards resulted in the deaths of 13 infants in 2004 from feedings of adulterated powdered milk. To maintain the reputation of Chinese foods among Western buyers, a tracking system imposed by the Chinese Agriculture Ministry in 2011 encouraged grocers to determine sources of adulterated food.

Currently, the U.S. Federal Trade Commission (FTC) monitors the media and investigates such deceptive practices as the injection of brine or broth in turkeys, the padding of TV dinners with gravy and sauce rather than whole foods, and the coloring of peanut butter with cocoa butter and malt. Another market problem involves false or misleading advertising, a common complaint against food labels claiming that contents are "green" (eco-friendly), "light," or "organic." To halt ambiguous and misleading claims, such as the United Egg Producers' "animal care certified" eggs, the FTC requires corrective advertisements to disclose a true representation of the product, particularly claims of vitamin C in soft drinks, vegetarian pork and beans, and 100 percent beef in hot dogs.

Passage of the 2011 U.S. Food Safety Modernization Act improved consumer protection by setting guidelines for preventing food-borne illness. Statutes address defilement during harvesting, processing, packaging, and transport.

Among changes in handling regulations, the law requires importer accountability of foods from foreign suppliers and certification of high-risk foods, including berries, fresh fruits and herbs, and juices. The law focuses on seafood, 75 percent of which comes from offshore sources, some from rogue traders. Expanding on the 2002 Bioterrorism Act, the new Food Safety Modernization law requires mandatory seizure and recall of suspicious foods that fail to meet U.S. standards.

Worldwide, the transfer of food from port to port demands stepped-up scrutiny. In 2010, the Canadian Food Inspection Agency intercepted meat pies containing undeclared milk. In Australia, the Competition and Consumer Commission recalled weight-loss products made from poisonous oleander seeds and Lindt milk chocolate containing peanuts, an unlisted allergen that can cause death. The Australian commission intervened in the marketing of substandard almonds, calamari, chorizo, dried kelp, pine nuts, salmon, and smoked trout. Following an earthquake that caused leakage from the Fukushima nuclear power plant in Japan on March 11, 2011, the EU took action against radioactivity by limiting imports of beef, fish, fruit, mollusks, mushrooms, and vegetables from the region.

See also: Additives, Food; Adulterated Food; Sanitation.

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Cook, James (1728-1779)

Explorer, cartographer, and a primary source of observations on the Pacific diet and culture, Captain James Cook chose to study people living on the opposite side of the globe from Europe.

A Yorkshireman, he was born at Marton, near Middlesbrough in England, on November 7, 1728, to Grace Pace and James Cook, a Scots farmer. After study at the Postgate School and apprenticing to a grocer, he went to sea at age 17 on a coal coaster. After educating himself in astronomy, mathematics, and navigation, he sailed aboard traders to the Baltic Sea. During the Seven Years' War, he rose in the ranks of the Royal Navy and earned commendation in Quebec.

In 1766, during his four-year exploration of Newfoundland, his crew warded off scurvy by drinking Canadian spruce beer, which was cheaper than lemon or lime antiscorbutics. Cooks on board brewed the drink from Sitka spruce using a recipe dating to the 1620s. Upon reaching Nootka Sound, Captain Cook sent shore parties in search of spruce to replenish hogsheads of beer.

Also in 1766, the admiralty assigned Cook command of the HMS *Endeavour*, a 369-ton (335-metric-ton) research bark. With funding from King George III, Cook made four expeditions to the Pacific.

On his first voyage from Plymouth on August 26, 1768, he and 94 others sailed for the Royal Society around Cape Horn, Chile, to Tahiti and eastern Australia. Among the provisions for 18 months, Cook stocked a goat, hens, and pigs along with beer, brandy, cheese, oatmeal, oil, peas, rum, salt, and sugar. On September 12 at Madeira, he added fresh beef, fruit, greens, onions, sweets, and wine for the next leg to Rio de Janeiro, Brazil. In mid-November, he restocked fresh and jerked beef, greens, and pumpkins for the risky rounding of Cape Horn. He noted that Brazilian traders made the most of their location by charging exorbitant prices for cassava, grain, pork, poultry, and yams.

Beginning with landfall at the Bay of Good Success in Tierra del Fuego, Chile, on January 15, 1769, Cook's botanists, Joseph Banks and Daniel Solander, collected the first of a total of 3,000 plant specimens, many of them unknown in Europe. Observations of the diet of southern South America reported native dependence on the meat of the guanaco, a member of the llama family, as well as cranberries, limpets, mussels, and wild celery.

The *Endeavour* reached Tahiti on April 10 and remained there until July 13 before searching for Terra Australis Incognita (Unknown Southern Land), which geographers wrongly surmised lay separate from Australia. Cook and his surgeon, William Monkhouse, took precautions against scurvy by dispensing malt wort (malt extract), portable (dehydrated) soup, and sauerkraut. The crew cultivated friendships with native traders in canoes, who bartered coconuts and fruit for cloth and iron. The Tahitian chief, dubbed Lycurgus by the crew, feted Cook and his officers with broiled fish and coconuts and offered plantain trees to take back to England. Other gifts of breadfruit and pigs symbolized trust.

At Poverty Bay, New Zealand, Cook admired the wellness and sturdy frames of elderly Maori, who remained energetic into advanced age. In his observations of Gweagal hunter-gatherers at Botany Bay, Australia, he found their simple lifestyle far more satisfactory than European lives. They lived serenely and stockpiled no food, but relied on nature to provide necessities. The voyage concluded with a long layover near the Great Barrier Reef, off the coast of Queensland in northeast Australia, and a return route past Possession Island in the Torres Strait Islands off the coast of northern Queensland, and Batavia (Jakarta), Indonesia, then around the Cape of Good Hope at the southern tip of Africa.

Cook and his crew reached Dover on July 12, 1771, without a single loss to scurvy. Physicians acknowledged his wisdom in stocking the ship's pantries with fresh food. Both he and naturalist Joseph Banks published journals, which Cook recorded in triplicate for posting to the Royal Admiralty.

In 1772, Cook accepted a second commission from the Royal Society to locate the reputedly massive continent of Terra Australis. On the HMS *Resolution*, Commander Cook paralleled the route of a sister ship, the HMS *Adventure*, and, on January 31, 1774, reached Antarctic waters. His Pacific route via Easter Island, the Friendly Islands, New Caledonia, Norfolk Island, and Vanuatu quashed the myth of a Terra Australis that connected to Antarctica. A premature retirement preceded a third expedition to locate the fabled Northwest Passage, a sea route from the Atlantic to the Pacific through Arctic waters.

In 1776, Captain Cook sailed the HMS *Resolution* and led the HMS *Discovery* to Tahiti and north in 1778 to the Hawaiian cluster, which he named the Sandwich Islands. He surveyed Nootka Sound at Vancouver Island and spent a month

trading metal objects for sea otter pelts in Yuquot Indian villages. During his forays north to the Bering Strait, his crew sampled walrus meat but found it inedible.

After his journey south to Kealahou Bay, Hawaii, he observed Makahiki, the harvest festival for the god Lono. Hawaiian natives murdered Cook and four mariners on February 14, 1779. Upon the return of his ships in October 1780, Captain James King completed Cook's journal. Historians lauded Cook's circumnavigation of the globe without crew losses to scurvy and his observations on Pacific peoples.

See also: Breadfruit; Jerky; Lapérouse, Jean François Galaup; Seaman's Diet and Cuisine; Soups.

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Cookbooks

A culinary reference source from early times to the present, cookbooks compile distinctive collections of recipes that reflect regional ingredients and individual tastes in cuisine. Published food chronicles fall into two broad categories—a compendium of dishes on a particular subject, such as barbecuing, Indian curry, or frozen desserts, and a tutorial for professional caterers, chefs, and institutional cooks.

Ritual cookbooks from Mesopotamia exemplified local enthusiasm for refined cookery of birds, shellfish, and turtles. In 1900 B.C.E., Sumerian-Akkadian cooks

cataloged 800 sophisticated dishes and beverages. Recipes from the state dinners of Assyria and Elam consist of clay pot and metal cauldron cookery of gazelle, kid, partridge, and pigeon and turnip stew.

Two centuries later, Mesopotamians summarized banquets in cuneiform on three clay tablets, one of the earliest recipe books committed to writing. Among the details, the food writers described the stuffing of meat into sausage casings, fermenting fish and grasshoppers into a condiment, and solidifying cream cheese. More than taste, they lauded the aroma of fat-fried meat and onions as essential to good eating.

Early in the first century C.E., the Roman merchant and author Marcus Gavius Apicius described in *De Re Coquinaria (On Cookery, ca. 35 C.E.)* the pickling of anchovies in *garum* (fish sauce), a savory touch during the reign of the Emperor Tiberius. In 77, Roman encyclopedist Pliny the Elder identified 1,000 species of fish for the table and complementary flavors but cited no cooking instructions. Written in Egypt, Greek gourmand Athenaeus's 15-volume miscellany *Deipnosophistae (The Banquet Philosophers, ca. 190)* recorded the Greek love of menonly table fare and jolly conversation near brazier fires. Among his recipes, *kandaulos* illustrates the stewing of meat with anise, breadcrumbs, and grated cheese to create an aphrodisiac. Simpler recipes tend toward Attic figs, honey and sesame cakes, roasted boar, fried cakes, spitted apples, and fragrant berries fermented into vinegar.

Medieval Kitchen Guides

Medieval food writing focused on the culinary advances of the period. Syrian author Ibn Sayyar al-Warraq summarized the Abbasid foodways and etiquette of the Arabo-Islamic bourgeois in *Kitab al-Tabikh (Book of Dishes, ca. 950 B.C.E.)*. A thorough examination of medieval tastes in 132 chapters, it enumerated 600 hot and cold dishes, featuring bird pies, dips, cereal grains, fried meats, roasted game and kid, pudding, saucing, spicing, and stuffing. Al-Warraq's comprehensive food knowledge and experience enabled him to describe Mediterranean specialties, including Egyptian raisin wine and Persian antelope cooked in onion juice. He advocated the use of apricots, honey, prunes, and vinegar to orchestrate sweet

and sour dishes. Several of his recipes for *harissa*, a savory paste, required labor-intensive shredding, grinding, beating, and straining of chicken, fat, milk, rice, and sugar for cooking on a three-legged brazier.

A subsequent cookbook of the same name, written in 1235 by Hassan al-Baghdadi, listed only the 160 recipes he liked. The text revealed a profusion of herbs and spices—celery, cinnamon, coriander, cumin, dill, ginger, gum mastic, mint, peppercorns, saffron, sesame, sumac, and thyme—the flavors of pastries, pickles, salads, and vinegars that had aroused the appetites of Crusaders. Not listed by dry measure, the apricot and lamb *tagines* (slow-cooked stew) thickened with ground almonds and perfumed with rosewater and orange blossoms required the cook's instinctive skill at balancing aroma, flavor, and texture.

After the publication of two anonymous classics, the Latin *Liber de Coquina* (*Book of Cooking*, ca. 1300), compiled anonymously in Naples, and the first German cookbook, *Daz Buch von Guter Spise* (*The Book of Good Food*, ca. 1350), the Norman French contributed a unique survey of medieval kitchen techniques and cuisine in Taillevent's *Le Viandier* (*The Provisioner*, ca. 1375). Two of his suggestions, a description of entremets (palate cleansers) and herbed chicken broth, presaged the refined food service that the French developed into haute cuisine. None of the three forerunners matched the influence of the anonymous *Le Ménagier de Paris* (*The Goodman of Paris*, 1393), a didactic handbook for brides. The text advanced from meat cook

[Recipe: Lamb and Apricot Tagine](#)

Sauté two chopped red onions in 2 tablespoons of vegetable oil. Add 2 1/2 cups of water, 2 pounds of cubed lamb shoulder, 1 1/2 teaspoons of cinnamon, 1 1/2 inches of ginger sliced, 1/2 teaspoon of cumin, and 1/4 teaspoon of chili powder. Simmer the mixture on low heat for 90 minutes, remoistening as necessary. Season with ground pepper and sea salt to taste. Add 1 pound dried apricots and 1/4 cup of raisins and simmer another 30 minutes.



A home chef uses a recipe from the original *Joy of Cooking* (1931) to make a German potato salad. Self-published by St. Louis homemaker Irma S. Rombauer, *The Joy of Cooking* has sold more than 18 million copies in multiple editions. (MCT/Getty Images)

ery to a variety of instructions for incorporating eggs, frogs and snails, pastry, and vegetable soups in the diet.

The first Chinese cookbook concentrated on food for the privileged. From service to the mid-thirteenth-century Celestial Throne, Huou recorded pantry tastes and feasts honoring the Emperor Kublai Khan. Huou's three-volume survey, *Yin-shan Zheng-yao* (*Proper and Essential Things for the Emperor's Food and Drink*, 1330), listed court details, particularly for making and serving soups. Late in the Middle Ages, Eurasian communication increased along the Silk Road, China's main link with the West.

Renaissance Advances

The printing press turned cookbooks into an affordable resource for wealthy domestic and professional cooks, who read aloud to illiterate servants. The shift from mundane potages and roast meats reached a height of professional cookery in *Forme of Cury* (*Forms of Cookery*, ca. 1390) from the household of Richard II and Bartolomeo Platina's *De Honesta Voluptate et Valetudine* (*On Honorable Pleasure and Health*, ca. 1465). The first work introduced the French terms

blancmange, a costly food paste, and *pain fondue*, bread for dipping into sauce. In 1570, chef Bartolemeo Scappi issued recipes in Italian for marzipan in his 1,000-recipe collection, *Opera dell'Arte del Cucinare (Culinary Works of Art)*. He stressed dishes incorporating goose liver and Parmesan cheese and listed egg, fruit, nut, and rice recipes for meatless meals.

In England, Sir Kenelm Digby, a polymath and privateer, wrote *The Closet of the Eminently Learned Sir Kenelme Digbie Knight Opened* (1669). A private journal published posthumously by Digby's son John and Hartman, the household steward, the free-form text explains the food preferences of the late Renaissance. Courses range from meat pasties and vegetable potage to jelly, pies, and *syllabub*, a milk punch. Digby elaborated on the fermentation of cider, metheglin, and wine. With less pomposity, Hannah Wooley, the first female cookbook compiler produced *The Queen-like Closet; or Rich Cabinet* (1670). The text reported the womanly arts of the Restoration era, including the candying and preserving supervised by the queen, Catherine of Braganza.

At the end of the Renaissance, French food writer François Massialot, the chef to Philippe I, duke of Orléans, saluted the aristocratic table with *Nouveau Cuisinier Royal et Bourgeois (New Cookery for Royalty and the Middle Class, 1692)*. He expressed his intent to please princes and “people of the first rank” with elaborate crème brûlée and meringue. His text introduced alphabetized recipes, a forerunner of the gastronomic encyclopedia, and remained a kitchen resource for the next five decades.

The Age of Wisdom

Eighteenth-century cookbooks deserted royal kitchens and focused on the everyday eating and curative foods of Americans and Europeans as viewed by females. In Williamsburg, Virginia, Eliza Smith's best seller, *The Compleat Housewife; Or, Accomplished Gentlewomen's Companion* (1727), summarized kitchen duties, from breakfast, lunch, and dinner to trays for invalids and home simples for contagious diseases. Published in the American colonies in 1742, Smith's directives instructed women on household issues of dressing eels and pickling mushrooms and mapped out the kitchen as a female domain. She encouraged

women to distribute tasty foods to their neighbors and to share recipes for beverages, jellies, pickles, and preserves along with cordials, ointments, syrups, and tonics. Lacking from her era of food writing were dish size, precise measurements and portions, and exact temperatures. In their place appeared “a pinch,” “a penny’s worth,” “a piece of butter,” “a glassful,” “warming temperature,” and “a slow oven.”

A colonial kitchen landmark, Martha Custis Washington’s *Book of Cookery* (1749), a handwritten heirloom, served the cooks at Mount Vernon for a half century. A bride gift from Frances Parke Custis to her 18-year-old daughter-in-law, the compilation derived from British cookery. Recipes maintained ties with the mother country in its Elizabethan and Jacobean menus and table style. Into the federalist period, cooks imported key ingredients—almonds, oranges, wines. The 500 recipes retained homey touches in instructions for chicken pie, fritters, and raspberry marmalade.

A shift toward indigenous ingredients took the redirection of English food author Hannah Glasse’s *The Art of Cookery Made Plain and Easy* (1747). Susannah Carter’s *The Frugal Housewife* (1772) featured North America’s food legacy in corn and cornmeal, cranberry sauce, Jerusalem artichokes, molasses, pumpkin, and squash and introduced American cooks to pearl ash, an early form of baking powder. Connecticut writer Amelia Simmons’s self-published *American Cookery* (1796), the nation’s first original guide to fireplace techniques. Although Simmons plagiarized recipes from a previous collection, her work banished frippery and excess and revealed to the inexperienced kitchen worker pragmatic methods of reducing waste and producing meals suited to a limited budget. Later editions of Simmons’s collection promoted patriotic cookery of Election Cake, Federal Cake, and Independence Cake.

Cookbooks as History

The emerging no-nonsense style of food writing influenced Mary Randolph, author of *The Virginia House-Wife* (1824), who documented the foodways of the new nation. Among the Southern dishes popularized in her book, she outlined recipes for barbecued pork, beaten biscuits, catfish, gumbo, and okra.

Philadelphia cook Eliza Leslie followed Randolph's practical advice with a book on desserts, *Seventy-Five Receipts for Pastry, Cakes, and Sweetmeats* (1828), a testimonial to her kitchen business. Among the Americanized treats, she introduced Indian Pound Cake, a four-ingredient dessert that replaced cake flour with cornmeal.

By the Industrial Revolution, cookbook publication burgeoned in response to a concern for a healthful diet and temperance. Eliza Acton, author of *Modern Cookery for Private Families* (1845), originated a uniform code of exact timing and quantities of ingredients. Educator and domestic expert Catharine Esther Beecher's *Miss Beecher's Domestic Receipt-Book: Designed as a Supplement to Her Treatise on Domestic Economy* (1846) took a scientific approach to home management. She incorporated her views on mothering and wellness into recipes for weanlings and invalids. Reformer Alexis Soyer summarized simple meal planning in *A Shilling Cookery for the People* (1854), in which he informed the poor that vegetables offer more nutrition than ale, bread, and cheese.

Throughout the 1800s, self-conscious decorative cooking gave way to the national diets that arose from common staples. In place of imported haute cuisine, Poles reclaimed sausage; Jamaicans celebrated the pepper pot. In the American colonies, clam chowder and Christmas ambrosia denoted high points in comfort food, the featured dishes that marked family tradition and clan solidarity. Editors Lydia Maria Child and Sarah Josepha Hale created a stir with Child's *The American Frugal Housewife* (1829) and Hale's *The Good Housekeeper* (1839) and *Mrs. Hale's Receipts for the Million* (1852), all favorites with working-class housewives. Child offered hands-on advice, such as the boiling of a calf's head with the esophagus hanging out of the pot as an escape route for scum. Hale suggested uses for calf's knuckles, cod heads, and haunches of venison, which she valued fresh-killed as sources of soup.

In the era of the coal cookstove, Isabella Mary Beeton, the touchstone of Victorian cuisine, reached culinary stardom with *Mrs. Beeton's Book of Household Management* (1861). The first recipe book to list ingredients before preparation instructions, the text also estimated preparation cost and time—for example, the one-hour chilling of almond cream or simmering a large ham for six hours. Her collection of 900 recipes remained in print for a century and, as demonstrated in the BBC-TV drama *The Secret Life of Mrs. Beeton* (2007), the

collection earned respect as a monument to cultural and social history.

During the American Civil War, women's groups introduced a regional branch of food authorship by issuing the first fund-raising cookbooks. Their pamphlets aided the Sanitary Commission in opening and equipping rehabilitation centers for the wounded. The first charity collection, *Camp Cookery and Hospital Diet, for the Use of U.S. Volunteers, Now in Service* (1861), proved a valuable outlet for women who wanted to aid the war effort. Their decision to turn home-style recipes into salable commodities prefaced the subsequent suffrage movement and women's use of publication as self-expression and consciousness-raising, the purpose of *The Woman Suffrage Cook Book* (1886) and *The Settlement Cookbook: The Way to a Man's Heart* (1901). The latter, in circulation for a half century, introduced beginning cooks to level measures, fireless cookers, and pasteurizing milk to protect children from contagious disease.

European food writers produced valuable overviews of period gastronomy. Cookbook compiler Elena Burman Molokhovets preserved classic menus in her household text *A Gift to Young Housewives* (1861), which reached a print run of 295,000 copies. In the last 56 years of the Romanov dynasty, she taught the Russian bourgeois housekeeper how to ferment fruit liqueurs and how to plate and garnish pâté and mousse for a feast. Another regional best seller, Italian author Pellegrino Artusi's *La Scienza in Cucina e l'Arte di Mangiar Bene (Kitchen Science and the Art of Eating Well, 1891)*, achieved fame in translations into Dutch, English, German, Portuguese, and Spanish.

The Gilded Age returned ornate dishes to prominence. Charles Ranhofer's grand *The Epicurean* (1894) surveyed the culinary feats of Delmonico's chefs in New York City. His contemporary, French chef Georges Auguste Escoffier, published the first comprehensive cookbook for chefs, *Le Guide Culinaire (The Culinary Guide, 1903)*, a meticulous compilation of over 5,000 recipes. Whereas Ranhofer named his dishes for prominent people—a salad for novelist Alexandre Dumas and a potato dish for actor Sarah Bernhardt—Escoffier retreated from grandeur to focus on teaching the next generation of chefs.

Home Economics Movement

Professional kitchen work showcased the artistry of home economists Juliet Corson, Mary Johnson Lincoln, Maria Parloa, and Sarah Tyson Rorer, all cookbook authors, who debuted cooking school techniques and scientific food analysis to the home kitchen. Following the introduction of all-electric cookery at the 1893 Chicago World Fair, food writing voiced precise cooking instructions for predictable results. Women's magazines—*Better Homes and Gardens*, *Godey's Lady's Book*, *Good House keeping*, *McCall's*, *Woman's World*—published recipes and culinary lessons, which editors issued in book form. A favorite, *The Good House keeping Woman's Home Cook Book* (1909), replaced the work of well-known food writers with the gleanings of recipes sent to the magazine for testing in the in-house kitchen. *The Better Homes and Gardens New Cook Book* (1930) sold 20 million copies by emphasizing good-tasting meat loaf, scalloped potatoes, and fruit pies.

To accommodate a sedentary lifestyle, home economist Fannie Merritt Farmer, America's top culinary writer, composed in longhand the bible of the American kitchen, *The Boston Cooking-School Cook Book* (1896). The text introduced the first scientific formulation of measurements and methods for the home kitchen. Her 12-course holiday feasts captured the spirit of families seeking social attainment through food service of such exquisite dishes as calf's-foot jelly and mock turtle soup. Farmer's perspective and tone influenced a subsequent classic, Irma Starkloff Rombauer's *The Joy of Cooking* (1931), which, in turn, set standards for food maven Julia Child, the great celebrity food writer of the twentieth century. General Mills exploited women's demand for recipes with *Betty Crocker's \$25,000 Recipe Set* (1933), the beginning of a series of house hold favorites. With *Betty Crocker's Picture Cookbook* (1950), the company introduced branding, prepackaged ingredients, and inexpensive one-dish meals.

In 1938, French editor Prosper Montagné issued *Larousse Gastronomique: The Encyclopedia of Food, Wine, and Cookery*, a culinary gem containing 3,800 recipes. A vast sourcebook on the provenance of foods and their preparation for cooking, the work entered its third edition in 2001 under the subtitle *The World's Greatest Culinary Encyclopedia*. Among the traditional French strategies the chef demystified were braising, forcemeats, and wine selection.

World War II advanced concepts of kitchen technology by specifying mixer speed and freezing temperatures for ices. Food processors involved homemakers

in the compilation of cookbooks, notably, the Pillsbury Bake-Off texts first published in 1949. Women's clubs marketed their expertise. The oldest, *Charleston Receipts* (1950), derived from South Carolinians in the Junior League. American experiences in distant settings increased interest in Asian food, which Lin Tsuifeng encouraged with *Cooking with the Chinese Flavor* (1956), an introduction to implements and ingredients unfamiliar to most American cooks. The book preceded the era's monolith, Julia Child's *Mastering the Art of French Cooking* (1961), a training course in culinary expertise.

The eco-friendly approach to cooking reached the public in Frances Moore Lappé's *Diet for a Small Planet* (1971), a humanitarian's guide to foods less wasteful of Earth's resources. Lappé used the book's success as a springboard to informing readers about climate crisis and world hunger. Her concept of complementary animal and plant proteins angered vegetarians, who riposted with facts about human nutritional needs.

The past half century has favored multicultural kitchen instruction on everything from Kosher and soul food to Cajun, Tex-Mex, and Thai. Television spawned illustrated recipe collections the quality of bridal suppers in Martha Stewart's *Entertaining* (1982) and homey entrees in Rachael Ray's *30-Minute Meals* (1999), a boon to the workingwoman. In the health-conscious 2000s, food writing has targeted specific ills, for example, Robyn Webb's *The American Diabetes Association Diabetes Comfort Food Cookbook* (2011), Carol Fenster's *1,000 Gluten-Free Recipes* to help sufferers from celiac disease, and *Giving Hearts Cookbook* (2011), a police department collection from Aurora, Colorado, dedicated to cancer survivors.

See also: Apicius; Athenaeus; Beard, James; Câreme, Marie-Antoine; Child, Julia; Food Network; Huou; Ice Cream; *Larousse Gastronomique*; La Varenne, Pierre; Medieval Diet and Cuisine; Pan-European Diet and Cuisine; Pasta; Pennsylvania Dutch Diet and Cuisine; Soul Food; Soyer, Alexis; Taillevent; Tofu; Tudor Diet and Cuisine.

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Cooking Schools

Culinary schools prepare students for operating an efficient, hygienic kitchen that produces attractive, nutritious dishes and drinks for varied occasions.

Le Cordon Bleu

In the 1600s, *cordobleu* (blue ribbon) became a superlative applied to anyone who succeeded in any profession, particularly cookery. The term derived from an exclusive sixteenth-century order of knights, *L'Ordre du Saint Esprit* (Order of the Holy Spirit). Founded by Henry III of France in 1578, the order honored royalty and nobles and awarded them gold crosses on broad blue ribbons, the school's emblem of excellence. In memory of distinguished aristocrats, acclaimed chefs prepared the period's most elegant menus. The blue ribbon epitomized the high standards of the Institut de Saint-Louis, a private laboratory school opened in 1686 at Saint-Cyr, France.

Françoise d'Aubigne, the royal consort of Louis XIV, founded the institute to prepare young women for food service in strict classical style. She limited the student body to 250 daughters of impoverished aristocrats and army officers. D'Aubigne supervised curriculum, stocked the pantry, demonstrated recipes, and observed institutional thrift, down to napkins and aprons. Backers for the project included playwright Jean Racine, poet Nicolas Boileau, minister François Fénelon, composer Jean-Baptiste Lulli, and speech teacher Madame de Brinon. On

graduation, each chef received a dowry of 3,000 crowns and the blue ribbon, a symbol eventually worn by the school's 1,121 diplomates.

No name resonates so impressively among cooking institutes as Le Cordon Bleu of Paris, the source of a rigorous culinary education and the world's model of kitchen professionalism. The school derived from a weekly newsletter, *La Cuisinière Cordon Bleu (The Blue Cord Cook)*, published by French journalist Marthe Distel in 1895. The text offered illustrative and tutorial articles by famous chefs as well as food prep advice, discussions of gourmet dining, and a world-class recipe collection.

At the Palais Royal, Distel organized free classes in *cuisine pratique* (practical cooking) and *haute cuisine classique* (elegant classical cookery), the revered cuisine of Georges Auguste Escoffier and Marie-Antoine Carême. Distel initiated the first hands-on training where students sampled their teachers' dishes. The school evolved into a network of 27 divisions in 17 countries.

For chefs in training, celebrity pastry chef Charles Barthélémy, food writer Auguste Colombe, curriculum director Charles Driessens, and caterer Charles Poulain demonstrated their arts and, without charge, taught kitchen skills to subscribers. One distinguished faculty member, Henri-Paul Pellaprat, taught at the school for 40 years. While on staff, he compiled *Les Secrets Culinaires: Une Belle Table de Bonnes Recettes (Culinary Secrets: The Handsome Table of Good Recipes, 1930)*, *L'Art Culinaire Moderne: La Bonne Table Française et Étrangère (Modern Culinary Art: The Good Table, French and Foreign, 1949)*, and *La Cuisine Familiale et Pratique (Practical Home Cooking, 1955)*.

The Cordon Bleu grew into the leading gastronomic institution by attracting promising pupils worldwide. In 1933, chefs Dione Lucas and Rosemary Hume, two of Pellaprat's protégés, opened London's L'Ecole d'Petit Cordon Bleu, the institute's first branch, and added British dishes to the standard French menu. In the late 1930s, Elizabeth Brassart superintended the Paris institute and modernized the traditional *cours de cuisine* (curriculum) to suit future needs.

Cooking as a Profession

The culinary arts drew students to the thriving home economics movement,

which got its start in 1879 from educator Fannie Merritt Farmer's classes for immigrant women at the Boston Cooking School. Two reformers, Juliet Corson and Maria Parloa, extended the training of chefs through public lectures and coursework at the New York Cooking School, which advanced from cookstoves to chafing dishes, urns, and other tableside appliances.

At food laboratories in large cities, class method involved students in work sessions that educated them in food chemistry and dietetics for cafeterias, hospitals, missions, rehabilitation centers, and retirement homes. The schools also offered meaningful training to women who chose home economics as a profession. Among the burgeoning educators for black women, Mary McLeod Bethune opened Bethune-Cookman College in Daytona Beach, Florida, in 1904 as an introduction to domestic science and the operation of a commercial kitchen.

After the attack on Pearl Harbor, Hawaii, on December 7, 1941, the U.S. Army prepared men for institutional food service. At the Army Cooking School at Fort Meade, Maryland, trainees for the Quartermaster Corps learned to stretch 42¢ per day to feed soldiers hearty meals of chicken and beef. To assess the appeal of military chow, budding chefs analyzed plate scrapings to determine which entrées and side dishes were less appealing.

At the end of World War II, the Pentagon accredited the Cordon Bleu in Paris and the Culinary Institute of America (CIA) in Hyde Park, New York, the nation's first academic cooking school, for training U.S. military veterans. According to the memoir *My Life in France* (2006), author Julia Child of the class of 1950 and chef Simone Beck spread the Cordon Bleu spirit of excellence to North America. In 1953, graduates Rosemary Hume and Constance Spry served cold chicken in mango chutney to foreign dignitaries at the coronation luncheon for England's Elizabeth II.

In 1960, the CIA initiated continuing education to keep students current with changing ingredients and methods. In the next decade, the CIA staff launched a culinary library and learning resource center. For its attainments in curriculum development, *Life* magazine dubbed the school the "Harvard of Haute Cuisine."

International Education

To maintain impartiality in the styles and tastes of the next generation of master chefs, cooking schools recruited American, Canadian, French, English, Spanish, and Japanese pupils. Students learned international cuisine, beginning with classic French and branching out to Asian, German, Mediterranean, Pan-Pacific, and South American cookery. Typically, professors distributed boxes of ingredients to prepare by prescribed recipes. In addition to displaying international buffets and formal dinners, students dined with chefs at world-class restaurants and hosted regional and ethnic dinners. Success netted each a diploma, a ticket to high-paying jobs as prestigious food specialists.

Because the Cordon Bleu and its famed blue ribbon gained a reputation for tradition, expertise, refinement, and innovation, it established locations in Ottawa, Sydney, and Tokyo. In 1988, it opened the Ottawa Culinary Arts Institute, Canada's first branch, and published a reference guide, *Le Cordon Bleu Complete Cooking Techniques* (1998). In 15 chapters, the institute's master chefs instructed home cooks on a variety of dishes in clear, concise language. In 2000, Le Cordon Bleu joined with Career Education Corporation to establish a Parisian cooking school in the United States in Mendota Heights, Minnesota; Pasadena, California; Pittsburgh, Pennsylvania; Portland, Oregon; and Scottsdale, Arizona.

Simultaneously, the CIA operated a variety of campus restaurants. To demonstrate Continental menus, students managed the Escoffier and the Ristorante Caterina de' Medici, venues for classic European dishes. American fare dominated the St. Andrew's Café, the Apple Pie Bakery, and the CIA Bakery Café in San Antonio.

Contemporary Training

Currently, culinary school certification in a broad range of skills prepares graduates for jobs with airlines and resorts, on cruise ships and trains, and in dormitories, hospitals, and restaurants. Vocational training in hospitality and resort management at the Box Hill Institute in Melbourne, Australia; the Cilantro Culinary Academy in Subang Jaya, Malaysia; Paul Smith's College at Adirondack State Park, New York; and the University of Santo Tomas in Manila, Philippines, retrieves academic kitchen management from an artisanal craft to a

moneymaking profession.

Specialty schools—DCT University Center in Lucerne, Switzerland; Johnson and Wales in Providence, Rhode Island; and Stratford University in Falls Church, Virginia—add a strong business basis to the study of baking, dietetics, food service, and hotel and tourism management. Escuela de Gastronomía Mexicana limits ingredients and techniques to Central American cuisine. At Lokichoggio, Kenya, students at the Culinary Institute of Africa learn solar cooking, a method that employs an aluminum-lined heat retention box as a heat source. For Asian industrial cookery, pupils apply to the Bhakti Industrial School of Cooking in Chennai, India. A one-on-one tutorial at the Nimmy Paul Cooking School in Kochi, India, focuses on the flavors of the subcontinent, including coconut milk, cumin, masala, and turmeric. In New Mexico, the Santa Fe School of Cooking introduces beginners to elements of Native American cuisine, such as annatto seed, chard, *epazote*, frybread, juniper berries, nuts, piki corn, posole, and prickly pear syrup, and to walking tours of restaurants over four routes.

Gastronomy preparation incorporates peripheral knowledge. Grégoire-Ferrandi in Paris focuses on catering and artisanal foods as well as restaurant design and kitchen layout. To ensure mastery of entrepreneurial cookery, Chicago's Kendall College in Evanston, Illinois, partners with the National Restaurant Association to stress health and business standards in food storage and preparation. Sullivan University in Louisville, Kentucky, expands its outreach through e-learning via online programs in hospitality.

Less comprehensive programs by the Alain & Marie Culinary Institute LeNôtre in Houston, Texas; Cambridge School of Culinary Arts in Cambridge, Massachusetts; Dumaguete Academy for Culinary Arts in Negros Oriental, Philippines; and Japanese Culinary Institute in Surry Hills, Australia, offer individualized coursework. Students may specialize in beverages, cake decoration, chocolate, ethnic cuisine, finger food, knife skills, meat and poultry, pastry, special diets, Sichuan cuisine, and sushi. The Culinary School of the Rockies in Boulder, Colorado, extends food internships with a farm-to-table study of biodynamics, including distilling, game butchery, recreational cuisine, root cellaring, and vine espaliering.

See also: Beard, James; Child, Julia.

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Cook-Offs

A culinary competition featuring one ingredient or style, a cook-off or bake-off channels recreational cooking into a charity, fair, or media event. The concept of cooking for prizes or blue ribbons began at agricultural fairs early in the nineteenth century. Some events required entries to contain a regional ingredient, such as cheese, chili peppers, pecans, or shrimp. The concept gained enthusiasm for state and international championships.

Most cook-offs have space and time limits. Judges dock cooks for unfair application of aluminum foil and for messy countertops or unclean cookware. Rules sometimes limit contestants to children and youths and reward them with cash and appliances. Recipes may appear in published collections, such as *California State Fair Demonstration Recipes, 1949–1959* (2010) and *The Harrow Fair Cookbook* (2010), compiled in Harrow, Ontario.

Participants in biscuit, butter bean, chocolate, corn bread, eggs, garlic, horse radish, olive oil, onion, pie, pineapple, potato, ramp (wild onion), spinach, and vegetarian/vegan cooking contests sometimes compete against specialists, such as chefs at Commander's Palace and Galatoire's in New Orleans. Some competitions involve name brands, including Golden Band, Kikkoman, Kona, Spam, and Martha White. The most popular cook-offs feature meats—barbecue, beef, catfish, chicken, chili, étouffée, gumbo, hamburgers, hot dogs, jambalaya,

menudo (beef stomach), ribs, seafood, and Tex-Mex.



The Georgia Cowboy Poetry Gathering hosts the annual Southeastern Chuck Wagon Cook-Off in the town of Cartersville. Teams use period ingredients to prepare a beef roast, beans, potatoes, biscuits, and dessert on an open wood fire. (*Dayton P. Strickland/Daily Tribune News/Associated Press*)

Many cook-offs are organized to aid community campaigns of one kind or another. Canada's Largest Ribfest, an annual cook-off in Burlington, Ontario, boosts tourism and raises funds for Habitat for Humanity, the Salvation Army, and Scout troops. A similar rib festival in London, Ontario, features food stalls, kitchen demonstrations, and music. In a departure from meat-centered cuisine, in summer 2010, People for the Ethical Treatment of Animals involved contestants from England and North America in a vegan cook-off, which awarded first prize to an oat and onion roast.

A contest unique to the North American frontier, Dutch oven events—called DOGs for “Dutch Oven Gatherings”—ban gas or electric stoves and require log fires and tripods. DOG competitions, such as the Llano River Chuck Wagon Cook-Off in Llano, Texas, and the Chandler Museum Chuck Wagon Cookoff in

Chandler, Arizona, imitate the outdoor cookery of pioneers. Using authentic equipment and unprocessed foods, participants vie in the bean, dessert, meat, potato, pie, stew, and sourdough or yeast bread divisions. All “cookies” prepare dishes from scratch in iron cookware.

As a more individualized contest, the bake-off encourages originality and innovation with a broader range of recipes. In 1949, Pillsbury initiated its annual contest, a salute to Americana and name brands. The event took place in 100 minikitchens in a ballroom of the Waldorf-Astoria Hotel in New York City. The results helped set trends in regional recipes for scratch cakes, cookies, pies, quick and yeast breads, and sweet rolls, such as the Orange Kiss-Me Cake in 1950 and Mardi Gras Party Cake in 1959. The challenge paralleled a resurgence in American baking and the influence of such television paradigms as Norwegian house wife Marta Hansen on *Mama* (1949-1957) and Margaret Anderson, the suburban mother on *Father Knows Best* (1949–1960).

Bake-off focus shifted in the 1960s as more women went to work. Pillsbury encouraged contestants to use cake mix, canned meat, frozen vegetables, potato flakes, processed cheese, and refrigerated dough and piecrust for Dilly Casserole Bread in 1960 and Magic Marshmallow Crescent Puffs in 1969. Ethnic ingredients and techniques broadened the bake-off spectrum in the 1970s, when cooks grew confident adding herbs and spices and using food processors and micro wave ovens to simplify preparation of a streusel cake, Danish rolls, and chicken

[Recipe: Cherry-Apple Dutch Oven Pie](#)

Sift together 2 cups of flour and 1 teaspoon of salt. Blend in 2 cups of shortening. Gradually add 5 tablespoons of ice water to form a dough. Divide the dough into two balls. Roll out the first ball and spread over bottom and sides of a Dutch oven. In a bowl, stir 2 cups of dried cherries, 1 cup of sugar, 3 tablespoons of cornstarch, 1 tablespoon of vanilla, and 3/4 teaspoons each of cinnamon, ground clove, and nutmeg into 4 cups of peeled, cored, and sliced Granny Smith apples. Pour this mixture into the crust. Roll out the second dough ball and spread over the top of the pie. Seal in steam by crimping the edges together with a fork. Dress the top crust

with one egg beaten with 1 tablespoon each of sugar and water. Bake for 40 to 50 minutes.

and broccoli pot pie. In 1978, the bake-off altered from an annual contest to a semiannual event.

Speed and shortcuts marked the next three decades of Pillsbury bake-offs. The 1980s featured international dishes and healthful meals as well as eye-catching garnishes on Almond-Filled Cookie Cake in 1982 and Chocolate Praline Layer Cake in 1984. More imaginative recipes in the 1990s called for blueberries, couscous, custard, and salsa. In 1996, Kurt Wait became the first male contestant to win the \$1 million grand prize by preparing a macadamia fudge torte. The 2000s stressed variants of the tried and true in a granola pie and Florentine panini.

See also: Barbecue; Chili.

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Cookware

The creation of containers and implements to facilitate heating food permeates the history of human manipulation of natural and manufactured goods. From the earliest kitchen work, forked sticks held raw ingredients in place for roasting over embers or flame, the earliest form of cookery. The second most common culinary

method, hypocentric baking, required heaping roots, truffles, and tubers with coals. Cooks handled baked pieces with tongs made from antlers, shells, or wood.

To distribute heat more evenly and delay charring, cooks coated fish, haunches of meat, and tubers with clay or wrapped them in banana and ti leaves. As early as 10,000 B.C.E. in Faiyum, Egypt, and elsewhere, preparers secured ingredients in bamboo tubes or baskets woven from birchbark, grass, palm, reeds, roots, rushes, vines, willow withes, or yucca. These advances made food more healthful and savory and shortened eating time.

Boiling eggs, seafood, and vegetables required waterproof containers, including animal craniums, clay pits, coconut husks, large mollusk shells, or turtle carapaces. In a container elevated on a stick frame or tripod, such as Havasupai and Zuñi baskets in the U.S. Great Basin and stone bowls in Tehuacán, Mexico, from 8000 B.C.E., ears of corn, muscle meat, and viscera cooked in a little liquid. A fireside staple from 7000 B.C.E., the first soups emerged from pit cookery or stone boiling, the dropping of heated stones into pouch hides, the bladders or stomachs of large animals, stone bowls, turtle shells, or wooden troughs.

Clayware

When clay separated from the outsides of baskets or gourds, cooks recycled the earthenware into the first clay cook pots. The concave shapes preceded the molding of pottery for such specific purposes as holding water for poaching birds and fish and steaming cereal grains and seaweed. Cooks soaked Chinese sand pots, *tagines*, and tandoor pots in water to create a moist enclosure for tenderizing meats. Flared edges facilitated pouring and transferring liquids. Lids directed condensation back into ingredients, producing complex flavors and moistening meats to tenderize them. Users tied lids in place to seal in steam and natural juices, the forerunner of gravy.

Fireproof earthenware and dense stoneware increased hearthside flexibility. Potters modeled useful shapes by coiling, paddling, and press molding. Before the building of kilns, cookware makers in Pakistan, Mesopotamia, and Nigeria sun-dried orange brown terra cotta. The rounded profile, such as the ware made at Catal Huyuk, Turkey, in 6500 B.C.E., aided stirring and spread heat evenly from

the fire to all sides of ingredients.

Iberian terra-cotta produced the *cazuela*, a work horse vessel that worked directly over heat for sautéing onions with saffron, simmering a Portuguese bean or cardoon and potato soup, or stirring up an aromatic *sofrito* from peppers and tomatoes. The smooth surfaces prevented evaporation of juices and easily soaked clean. A liability of earthenware, grit loosened by stirring tended to abrade tooth surfaces.

Experimenters used a variety of waterproofing—*asphaltum*, gums, *pinõn* pitch, resins, soap root, and tar—to seal earthenware *ollas*, splint baskets, and woven rice steamers. A tight seal facilitated the cooking of a one-pot meal. In the classic *olla podrida*, Iberian cooks evolved main courses of pork slow-cooked with beans or chickpeas.

In the 1600s B.C.E., Babylonian house holders dipped cooking baskets in molten bitumen. In Asia, ash, salt, and vitreous glazes sealed pores in carved teapots and clay tagines, some of which makers tempered by slow heating at the hearth or in a kiln. In Australia, Aborigines mixed cement from ash and gum to make conical baskets watertight.

From prehistory, the Zapotec of Oaxaca, Mexico, produced a cured *barro negro* (black clay) cookware that resisted shattering. After 1600 B.C.E., Chinese potters of the Shang dynasty shaped sturdy stoneware vessels and ritual cooking items for ancestor worship. The British pipkin, a lightweight saucepan on three legs, nestled in hot embers. Users inserted a wooden handle in the hollow nib at the side for ease of movement without endangering hands.

Metal Cookware

Metal pots advanced civilization by applying improved technology to the heating of delicate ingredients, particularly fish, porridge, and vegetables. After 1500 B.C.E., when the Hittites of Anatolia discovered iron ore smelting, they poured liquid metal into packed sand molds. Metal containers advanced cooking technology by conducting heat from flame into ingredients to render raw food more flavorful and easier to chew. Dark matte finishes absorbed heat and shortened the time needed for braising and simmering.

From the Roman era, iron kitchen *batterie de cuisine* (equipment) included elevated braziers and pots and pans on legs for setting on tripods and trivets or directly in the fire. For large cooking chores, overhead cranes suspended cauldrons. Cooks rotated the crane with angle irons to swing dishes outward for tasting, seasoning, and serving or for thickening with bread crumbs from an iron grater.

During the Middle Ages, a bottle jack or wind-up clock jack rotated meats in front of hearths and reflecting screens to ensure even roasting. A stiletto (iron pin) wrapped in dough and held over a pot enabled the cook to drop noodles directly into broth, a culinary technique invented by the Chinese after 25 C.E. Basket skimmers enabled the cook to fry directly in oil and to remove fish and pork slabs at the height of doneness.

As metallurgy developed, cookware conducted heat directly to ingredients, such as meringues and whipped toppings whisked in copper bulge pots and double boilers, tortillas on *comals*, and chapatis and waffles on griddles or gridirons. Eggs and meat slabs cooked directly on metal in fry pans, skillets, and spiders, three-legged skillets that nestled directly over hot embers. One dish, the Italian and Spanish *cassola* (casserole), cooked over flame or coals atop the vitreous glaze on the ceramic material.

The salamander, an iron plate on legs, provided a sturdy source of reflected heat for holding over dishes for broiling, browning, or toasting. Use of the salamander increased the success of endoring, the early Renaissance method of gilding or glazing the crust of a presentation piece—caul-wrapped kidneys, pigeon pie, roast kid, sturgeon, or veal's head—with savory egg yolk and saffron mixtures. Chefs to royalty extended endoring with real gold leaf and other metallic finishes hardened in lidded tureens or before metal screens.

Advanced Cookware

While the poor continued to cook in earthen pots and urns, house wares makers in the 1500s offered the wealthy expensive bronze, copper, and ceramic kitchen containers made to order. In 1679, French physicist Denis Papin added a new dimension to cuisine with his “marmite digester,” the prototype of the pressure

cooker. His application of steam under pressure cooked meats and vegetables faster than did ordinary pots, but it subjected cooks to scalds from explosions and spewing steam and cooking liquids. The concept remained unworkable until the presentation of the first commercial pressure cooker at the 1939 New York World's Fair.

A heavy material, cast iron yielded heavy-lidded pans and grills for suspending over campfires and hearths. Wrought iron, a cheap alternative, offered a high melting point but tended to scorch heavy fruit and vegetable mixtures and stews. The metal proved more practical as a source of tough griddles and turning forks. From the 1700s, cast iron suited the slow, even cooking of soups and stews. It required seasoning with oil or fat to prevent rust and sticking, a difficulty encountered by pioneers and chuck wagon chefs simmering pork and beans and baking corn bread and fruit cobblers in Dutch ovens.

Some metals left a metallic taste, as from the chemical reactions of copper or cast iron to acid from simmering tomatoes and vinegar or wine at high heat. The best in Renaissance cooking sets—copper cookware tinned on the inside—offset problems with off-flavors. In 1789, American patriot Thomas Jefferson, upon his return from a two-year embassy to France, equipped his kitchen at Monticello, Virginia, with 60 articles of iron and copper suited to French cuisine. Europe's latest designs included the *poissonnière* (fish cooker), *réchaud en cuivre* (chafing dish), and footed *tourtière*, a tart pan topped with a copper lid. His daughter, Martha Jefferson Randolph, used the trendy kitchen devices over charcoal fires to make omelets, pickles, and tomato gumbo. Because tin rapidly wore thin, itinerant tinkers traveled the country restoring linings, plugging holes in teakettles, and mending handles and lids.

Upon retirement from the military to Mount Vernon in 1785, George Washington provided his wife, Martha Custis Washington, with a model brick and slate kitchen. A grand fireplace held copper ewers and pudding molds, an iron spit rack, and kettles, pans, and pots clustered at the hearth. Slaves Hercules, Lucy, and Nathan cooked in embers or baked apples and custard pies in the brick bake oven. Implements on hooks swung cauldrons onto the flame with a crane for boiling cured ham and game. For himself, Washington operated five copper stills to extract barley, corn, and rye whiskey each year, a kitchen business that provided most of his income.

Iron cauldrons, roasting jacks (spits), and rotisseries and tinned bains-marie (double boilers), kettles, reflector ovens, sauce pots, and springform tart pans increased variety in cooking techniques. A metal hot closet kept dishes from cooling and warmed serving platters. One specialty cake pan, the tube pan, popularized in the 1880s, conducted heat to a cake's center and negated problems with damp spots and "sad streaks" (gummy batter).

Iron was cheaper and easier to find than copper and tin, but iron cookware proved more brittle and more easily corroded than bronze or tin. Maintenance of kitchen containers required daily polishing with ash or stove polish and constant repairs, especially of long-handled basting and saucing spoons and the spouts of teapots and coffee urns. To protect kitchen staff from burns, spills, and cuts, blacksmiths welded loose handles and finished raw edges with files, grinders, and wire brushes.

Scientific Cookware

Innovations designed for cooks continued to fill kitchens with new ideas, such as Margaret A. Wilcox's addition of a hot water tank to a stove flue in 1893. The receptacle recycled heat while keeping water at a usable temperature for blanching vegetables and scalding poultry. Clay roasters, popular in Germany and Scandinavia, accommodated whole poultry for braising without liquid.

Enameling with porcelain increased the usability of cast iron with a nonreactive, nonstick surface in black, blue, brown, and gray but increased the weight, endangering young cooks and people with arthritis. Industrial chemist Ellen Swallow Richards, author of *Food Materials and Their Adulterations* (1886), increased stovetop safety by adding a pouring lip on each side of saucepans. Her simple adjustment directed the flow of hot liquids while accommodating both right-and left-handed users.



The 1895 Montgomery Ward catalog promotes rustproof aluminum as the “coming metal,” soon to replace tin. Scientific advances have made cookware more specialized and efficient. Lighter than tin and iron, aluminum conducts heat more evenly. (*The Granger Collection, New York*)

The era of scientific household inventions profited in January 1900 from the formation of the Good Housekeeping Institute, which opened in Springfield, Massachusetts. Critiques in the institute’s magazine introduced homemakers to thrifty investments in kitchen utensils and small appliances—electric skillets, percolators, sandwich grills, toasters, and wafer irons for making ice cream cones. Practical advice explained how to butter iron gem pans for making muffins and spiders for cooking omelets, to grease iron racks for baking halibut, and to oil griddles for pancakes.

Aluminum offered a lighter frame for cookware and even conductivity of heat. WearEver introduced the innovative, rustproof metal in 1903. Six years later, Admiral Robert Peary took a set of WearEver cookware on his expedition to the North Pole. In 1910, *Good Housekeeping* magazine touted the Caloric Fireless Cook Stove from Janesville, Wisconsin. Among its assets, commentary named aluminum kettles and steatite (soapstone) roasting radiators. In 1911, Harvey W.

Wiley, the Good Housekeeping Institute's director, ranked aluminum saucepans above copper, iron, nickel, and silver. Within decades, aluminum accounted for 40 percent of U.S. cookware sales.

Whether anodized (thickened) or cast (molded) aluminum, the metal alloyed well with copper, bronze, and magnesium to produce biscuit and cookie sheets, canners, loaf pans, roasters, and stockpots. Cast aluminum suited the slow cooking styles of cake pans and Dutch ovens. In 1919, the Kewaskum Aluminum Company of Kewaskum, Wisconsin, patented Regal Ware as *waterless cookware*. The term drew homemakers to the brand for its promise of nonstick, nonscorching containers. In 1925, Le Creuset, a cookware manufacturer in Fresnoyle-Grand, France, distributed the first enameled Dutch oven, which the company offered in bright blue, brown, and cream.

Stainless steel, distributed by the Stainless Metals Company, introduced more beauty and durability to the cookware market in the 1930s. The wonder metal of the era offered an alternative to heavy pieces but heated as slowly as cast iron. Carbon steel heated faster, an advantage for sautéing and searing in a crepe or paella pan or low-oil stir-frying in a wok. Enameled steel, popular with campers, produced a workable, easily cleaned stockpot for water-based cuisine. Cladding solved individual drawbacks by layering aluminum, copper, and steel over baking pans, coffee urns, and samovars.

U.S. designers increased the convenience of cookware with ceramics, glass, porcelain, and silicone. Porcelain teapots in England tended to have spouts situated low to access the strongest brew at the base; ceramic and glass coffee pots offer spouts higher up to avoid the grounds that settle to the bottom during brewing. In 1915, Pyrex, a borosilicate glassware name brand made by Corning in Charleroi, Pennsylvania, manufactured the first kitchen casserole to tolerate freezing and baking and to stack with overturned lids in place.

In 1938, polytetrafluoroethylene further simplified kitchen chores by lining inner surfaces with a nonstick coating of powdered ceramic or titanium. Silicone ladles and spoons increased flexibility, a quality that also suited nonwoven oven mitts and hot pads. Colette and Marc Gregoire created a boom in French cookware with T-Fal, a combination of Teflon and aluminum. Teflon, invented by Roy Plunkett for Du Pont in 1938, proved ingenious for cookware because it ended the need for high-calorie fats to keep foods from sticking. The Gregoires

sold 36,500 T-Fal pans a year. Tupperware, a plastic phenomenon of the 1940s, survived to the present as a modern marketing legend with innovative series for freezing and microwaving.

The latter part of the twentieth century produced dramatic new conveniences for the cook. In 1951, engineer David Dalquist designed the Bundt pan, a cast-aluminum cake pan with a center tube and scalloped sides, for Nordic Ware of Minneapolis, Minnesota. One of the container's distributors, Williams-Sonoma in Northern California, founded by kitchen specialist Chuck Williams in 1956, added the Bundt pan to a line of cookware gleaned from England, France, Germany, and Italy. The cake pan gained publicity from the 1966 Pillsbury Bake-Off, which Ella Helfrich won with the Tunnel of Fudge Cake.

By the mid-1950s west of Elmira, New York, Corning distributed glass ceramics that tolerated oven and stovetop heating for casseroles that went from stovetop to table. In 1965, Tappan debuted the micro wave cooking center with a conventional range topped by a microwave oven. In the mid-1970s, as Corning, Tupperware, and other designers created containers for use in micro wave ovens, more changes in cookware lessened the weight of casseroles and pans and increased their versatility. Food processors invested in food packaging that contained ingredients during heating, notably, the film micro wave popcorn bag.

Small appliances restored to home cooking the convenience and slow-simmered flavor of past ages. The electric slow cooker, devised by Rival in Kansas City, Missouri, in 1971 and sold as the Crock-Pot, turned a brand name into a culinary style involving roasting and stewing in an unattended container. In the 1980s, the introduction of the bread machine created a trend toward home-risen loaf baking in a small appliance. Governed by a timer, the countertop baker also mixed and kneaded dough for panettone, pasta, pizza, and rice cakes.

See also: Bamboo; Blenders and Food Processors; Pit Cookery; Soups; Rumford, Count.

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Cooperatives, Food

A grocery store or chain operated by a private consortium, a food cooperative, or co-op, reflects the tastes and needs of a limited membership. To their mutual benefit, individuals seek joint ownership of the enterprise and manage it democratically by majority vote. In exchange for investment in the buying agency, families cut out the middleman and deal directly with growers.

Cooperatives save consumers on food costs through bulk buying, the initial purpose of the Berkeley Buyers' Club, which formed in California in 1936, and England's Northern Milk Partnership, founded in 1993. Nonprofit food clubs led the initiative toward ingredient identification, nutritional labeling, and unit pricing. Members received politically correct, eco-friendly products along with high-quality discount wines, organic produce and meats, and vegan specialties, including coconut cream and nondairy butter.

History

The procurement co-op concept started in 1832 in Nuneaton, England, with the Lockhurst Lane Industrial Cooperative Society, later renamed Heart of England Cooperative Society Limited (HECS). At Warwickshire, factory laborers enjoyed wholesale food prices at club supermarkets, which expanded to 33 locations. In addition to general foodstuffs, members purchased lunches and sandwiches. Subsequent dietary initiatives directed shoppers to quality foods and healthful cuisine. Some families have maintained membership in HECS for four

generations.

The Rochdale Society of Equitable Pioneers formed a model consumer consortium in 1844, a time of socialist experimentation in England influenced by the utopian philosophy of Robert Owen, owner of the New Lanark mills. The 28 flannel weavers who formed the buying club strove to overcome the fiscal losses and food adulteration incurred during the Industrial Revolution. By opening their own cash-and-carry grocery store, the society pooled money to purchase the club's first commodities—butter, candles, flour, oatmeal, and sugar. The co-op accepted any volunteer, regardless of gender, race, or religion, and adopted altruism and duty as goals promising a boost in quality of life. Members agreed to share surplus funds prorated by individual amounts of trade.



Shoppers examine the produce at a food co-op in Burlington, Vermont. With growing concerns about food safety, a preference for healthy eating, and a desire to support local farms, more Americans rely on groceries owned and operated by members. *(Toby Talbot/Associated Press)*

Owenism, the spark that fueled the food co-op, engendered additional attempts

at group savings on groceries. In 1863, the Cooperative Wholesale Society began in Lancashire and Yorkshire, England. Later food-purchasing consortia founded the Puget Consumers Co-op in Seattle, Washington, in 1953 and the Mondragón Corporation in Mondragón, Spain, in 1956. In 1999, the National Cooperative Grocers Association began selling natural foods in Iowa City, Iowa. Expanded to 160 stores in 34 states, the food co-op joined some 300 food-buying consortia nationwide. In 2002, Coop Norden formed in Scandinavia, serving Denmark, Norway, and Sweden with grocers, supermarkets, and hypermarkets. Finland joined the trend toward wholesale food cooperatives in 2005.

Concept and Operations

Shoppers patronize food co-ops like other stores, where clerks and managers facilitate purchases. Some clubs schedule members to work shifts on the premises, where child care is often available. The target clientele sets standards for purity and quality of out-of-the-ordinary farm commodities—courgettes, daikon radishes, galangal, goat's milk, kumquats, organic goji berries and granola, mung beans, nutritional yeast, and pine nuts—at the lowest price. Meat choices extend from free-range chicken, grass-fed beef, and kosher chicken livers and cold cuts to wild boar and other game. Annually, the club collects dues and distributes profits proportionally.

Membership enables individuals to control aspects of the family diet, primarily a diversification of natural foods, the object of Uhuru Foods, opened by the African People's Solidarity Committee in Oakland, California, in 1979, and Keimblatt, a green market organized in 1995 in Vorpommern, Germany. The Ypsilanti Food Co-op in Ypsilanti, Michigan, stocks honey from its own beehives and powers its bake ovens with solar panels. In Madison, Wisconsin, the Willy Street Co-op sells fresh soups and juices and teaches cooking and health classes. The George Street Co-op in New Brunswick, New Jersey, offers bulk herbs and vitamins, gluten-free bakery items, and meatless bologna and hot dogs, featuring minimal additives, allergens, and processing. The New Pioneer Food Co-op in Iowa City, Iowa, specializes in antibiotic-and steroid-free chicken, local lamb, French-style hearth bread, microbrewery beers, lactose-free products, seven-grain

flour, and sustainable, hormone-free seafood.

Larger stores advertise cruelty-free beauty and health aids and household goods, fair trade items, and the elimination of corn syrup, genetic modification, and trans fats from edibles. The People's Food Co-op in Portland, Oregon, models energy and water conservation with a geothermal exchange heating system and rainwater harvesting. Alfalfa House in Sydney, Australia, advertises farmer-direct produce and minimal packaging. Clubs also receive unique benefits, for example, education in vintages by the Australian Wine Consumers' Cooperative, founded in 1946, and the Organic Field School, and certified organic shopping and farm tours, introduced in 2008 at the Wedge Community Co-op in Minneapolis, Minnesota.

Social Activism

As conduits of social action, food cooperatives sometimes express member protest, especially the exploitation of migrant workers who harvest grapes and lettuce. The Park Slope Food Coop in Brooklyn, New York, which formed in 1973, opted to boycott Coca-Cola, Minute Maid, and Odwalla products for their exploitation of world farmers. Additional activism banned from shelves Chilean grapes, Nestlé products, and goods from South Africa during apartheid.

More recent resolutions discontinued the sale of bottled water and use of non-biodegradable plastic shopping bags as well as ended dealings with Flaum kosher products for labor law violations. In 2009, the sanctioning of Israeli products to oppose the occupation of Palestine involved Park Slope Food Coop members as well as the Rainbow Grocery Cooperative in San Francisco in addressing the ethical ramifications of imported foods. The success and moral example of Park Slope influenced other buyer's clubs, including the Cooperative Grocery of Emeryville, California.

Currently, Japan sets the example for rural and urban cooperatives, which began competing aggressively against retail food markets in the 1890s. A locavore group purchasing club, the Han Group, suits the needs of small neighborhood buying clubs that submit weekly electronic orders and receive fresh produce and staples by truck. Payment entails automatic bank transfers. The convenience to

the 1.2 million members is particularly beneficial to the disabled, elderly, homebound, working women, and young parents.

One of world's largest food cooperatives, Co-op Kobe, opened in Japan in 2003 and set an example of ethical and human practices and recycling based on the Christian pacifist principles of labor reformer Toyohiko Kagawa. The Kobe company used waste from bean curd and cooking oil to feed livestock and to generate electricity from its Rokko Island plant. In April 2011, the club's 1.3 million members began offering home delivery of packaged meals in Nishinomiya City.

See also: Agriculture; Local Food Movement; Sanitation.

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Coprolites

Fossil traces of digestion and diet, human coprolites (also called bezoar stones or paleofeces) retain mineral and organic evidence of nutrition, health, and cooking and eating styles. Archaeologists obtain specimens from ancient latrines, middens, caves, and human interment, including the colons of mummies.

By assessing the contents of coprolites—algae, undigested animal hair and soft tissue, bark, charcoal, feathers, fish bones and scales, fruit pits, insect shells, pollen, seeds, shells, spores, and stems—archaeologists gain insights into the availability of foodstuffs in a particular time and place and into the health and longevity of a single person. For example, at Wadi Kubbania in Egypt, analysis

of infant coprolites from 17,000 B.C.E. indicates that women alternated breast feeding with a high-carbohydrate diet of root vegetables.

By extension, researchers can use traces of magnesium, sulfides, and other mineral components from drinking water to assess the overall health of clans, social classes, and tribes as well as their annual or seasonal location. Endoparasite eggs, such as hookworm found at Antelope House in Canyon de Chelly, Arizona, indicate the level of sanitation, which degrades as population density increases.

From studies of the physical condition of maize kernels and cactus and millet seeds in coprolites, analysts have identified various methods of food preparation—grinding or pounding seeds to break the husks or roasting before grinding. Abrasion and mastication offer clues to dental disease and tooth attrition. The recovery of Mexican buckeye seeds along with coprolites containing minnow bones attests to prehistoric knowledge of the use of buckeye as a fish poison in West Texas.

William Buckland, a geologist at the University of Oxford in England, initiated interest in excrement analysis. Basing his study of fecal science on the work of English fossil expert Mary Anning, a paleontologist at Lyme Regis, Dorset, in 1829 Buckland called the desiccated objects coprolites (from the Greek *kopros lithikos*, “stone dung”). In 1896, John William Harshberger, a botanist at the University of Pennsylvania, established the significance of fossilized feces to the study of ancient ecosystems, carnivores, cannibalism, disease, food diversity, and the discovery and use of fire.

In 1960, Eric Otteban Callen, a professor of plant pathology at McGill University in Montreal, became the first coprolite specialist. He standardized analytic techniques for studying fungi, macrofossils, mollusks, parasites, and pollen as elements of diet patterns. He also overviewed prehistoric Peruvian diet at Huaca Prieta and the Pikimachay (Flea Cave) in the Ayacucho Valley and found maguey (agave) beer common to Mexican diet of 100 B.C.E. A decade later, scientists at Texas A&M University added pathogens to the regimen of fecal analysis.

The study of digested food enhanced ethnobotany. From studies of wheat seeds, scientists deduced that farmers in the southern Balkans grew einkorn wheat, perhaps the world’s first cultivated grain. Trace amounts of creosote bush, ephedra, goosefoot, and willow attested to early pharmacopoeia for treating

diarrhea, fever, intestinal parasites, and urinary disorders. Archaeologists began contributing data for perusal at archaeoparasitology laboratories in Brazil, Canada, Chile, England, Peru, and the United States. To recover human excrement from underwater sites, retrievers sample sunken storage jars, ships' bilges, and river or sea floors under sunken vessels. Until samples reach the lab, freezing protects pollen and tissue from fungus and microbes and preserves myosins and myoglobin (both types of proteins found in muscle tissue), evidence of the consumption of human flesh.

Coprolitic analysis requires protecting samples from contamination with masks, gloves, sterile forceps, and specimen bags or cups. Separation of particles begins with reconstituting the mass to its former pliability using a solution of trisodium phosphate. Analysts can determine food harvesting methods, consumption of raw foods, and the sophistication of cooking methods, whether on a drying rack, among rocks, on a spit, in a rock pit, on a parching tray, or in a clay or copper container.

Agave, one of the complex food staples of North American desert people, requires much preparation to soften tough fibers, including steaming or roasting in a rock-pit oven. In contrast, meals of cactus pads and sotol plants need less kitchen time and technology. In the Ozark Mountains of Arkansas, acorns demand leaching techniques to rid valuable nutmeats of bitter tannins; in contrast, a sweeter acorn that grows in the Lower Pecos area of Texas is edible raw or parched. Missing from the overall examination of diet, salad materials and leafy greens leave little recoverable residue after mastication and digestion.

Recovery of fish tapeworms shows that prehistoric humans in Chile and Peru ate raw fish. Identification of bark and eggs in samples from Hogup Cave in northwestern Utah adds dogwood and body lice to cacti, pick-leweed seed, and rabbit, the list of colon contents from hunter-gatherers of 6800 B.C.E.

The study of human excrement, whether charred, dried, or frozen, by specialists Vaughn M. Bryant, Karl J. Reinhard, and Kristin D. Sobolik has illuminated the climate and eating habits of humans in a variety of world archaeological sites, even identifying the subjects' ages. Paleobiologists identify levels of estrogen and testosterone to identify gender. Cataloguing of seasonal plants and pollens establishes the arrival of hunter-gatherers at particular sites.

Because of the dry climate of southwestern North America and Mexico,

coprolites have survived intact in the Chihuahuan Desert, Colorado Plateau, Great Basin, Great Gypsum Plain, Mojave Desert, and Tehuacán Valley. Coprolite findings at other sites in Chile, England, France, Holland, Israel, Peru, Sudan, and Tanzania have advanced comparative studies of world diet and nutrition.

In 2005, Eske Willerslev studied the DNA of 14 coprolites from Paisley Caves in the Summer Lake basin near Eugene, Oregon, at his lab at the University of Copenhagen. He established for the first time that Paleo-Indians of North America arrived as early as 12,300 B.C.E. He also surmised that food from the paleo-environment included biscuit root (wild parsley), bird, bison, dog, fish, grass, squirrel, sunflower, and possibly meat from a coyote, red fox, or wolf.

See also: Cannibalism; Fertile Crescent Diet and Food Trade; Middens; Nutrition; Paleolithic Diet.

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Corn and Maize

In a triad with rice and wheat, for 12 millennia, corn has nourished civilizations from cave and hut to cities and empires. A uniquely vulnerable grain, it requires human planting rather than dispersal by birds or wind. Its prehistoric name,

maize, derives from the West Indian Taíno word *mahiz*, meaning “sustenance.” The words *maize* and *corn* survive simultaneously in the Americas and the United Kingdom. South Africans prefer the Portuguese word *mealie*.

In the milk stage, early young ears, known as “sweet corn,” are tender enough for eating raw or for grating into creamed corn, an accompaniment to green beans. Later harvests, called “field corn,” yield dry kernels for pressing for corn oil, hydrolizing into corn syrup, distilling into grain alcohol and bourbon whiskey, mixing with gasoline for ethanol biofuel, or grinding into cornstarch, meal, or pet food. Farmers make the most of their investment by grinding stalks into silage for winter livestock feed.

Paleocorn

According to geneticist and Nobelist George Wells Beadle (in *Physiology or Medicine*, 1958), Mesoamericans domesticated corn from small-seeded teosinte (*Zea mays*) between Jalisco and Oaxaca, Mexico, around 10,000 B.C.E. Because of its rough exterior, teosinte declined in importance, but its offspring developed from a grass into a dietary keystone. The Olmec and Maya unlocked corn’s nutritional wealth through *nixtamalization*, a process of soaking kernels in slaked lime water or wood ash. They balanced their diet with amaranth, beans, chia, fish, and meat, sources of complete proteins.

Around 3600 B.C.E., Amerindians discovered popcorn, a food the Iroquois served at the first Thanksgiving in 1621 and Americans continued to eat as an inexpensive snack through the Great Depression and as a substitute for sweets during the rationing of sugar in World War II. In 1700 B.C.E., corn determined Mesoamerican foodways, religion, and identity. In the first millennium C.E., cultivation spread north through Arizona, New Mexico, and Texas.

The Hopi domesticated piki, a blue corn readily processed into meal for thin tortillas, a daily demonstration of female culinary skills. In the Mississippi River valley, the Mesquakie and Sauk developed kernels into flour, *masa* (dough), and posole or hominy, a soaked kernel eaten like a vegetable. The Narragansett of New England, who relied on corn for winter sustenance, stored dried grains in caches lined with grass.

History and Myth

Indians revered the symbiotic “three sisters” of gardening: beans, corn, and squash. The Cherokee turned kernels into hominy, a puffed vegetable, and *sofkee*, a hot beverage. Adaptation to a colder climate and shorter growing season evolved in the Great Plains and, by 1200 C.E., in Ontario, Canada. Around 1250 C.E., the Pawnee grew flint corn, a hard-kerneled variety, in the cold, wet climate of the Great Plains as a source of hominy. Cornfields eventually flourished from Argentina to California and the Dakotas and into the lower St. Lawrence River valley of Canada.

In the era of global voyages, Christopher Columbus first saw corn on November 5, 1492, when two sailors brought ears from Cuba. The explorer introduced corn seed in Iberia, France, and Italy by 1494. The Portuguese carried the grain to China in 1516. In 1535, French expeditioner Jacques Cartier found extensive corn cultivation in Montreal. In 1643, Roger Williams observed how Indians



Harvested feed corn shoots out of an auger wagon and into a truck for delivery to a storage elevator or processing plant. With an astonishing range of uses, American corn dominates global farm crops.

(Bloomberg/Getty Images)

[Recipe: Corn Pudding](#)

Make a slurry of three eggs, 1 cup of shredded Monterey Jack cheese, 1/4 cup of shredded pecorino cheese, and sea salt and pepper. Mix with 1 1/2 cups of fresh sweet corn. An optional ingredient, 1 cup of tomato pulp, adds an interesting acidic flavor. Pour the mixture into a buttered casserole dish and bake for 20 minutes at 350 degrees Fahrenheit.

carried corn in burden baskets as travel food and secured cornmeal in leather belts. The Mahican and Muscogee revered corn in planting ceremonies and the

Green Corn ritual, a harvest celebration that renewed the soil for the next year's planting.

Corn's versatility made it a welcome crop in North Africa, the Balkans, India, the Philippines, and the East Indies. The omission of the nixtamalization process spread pellagra and kwashiorkor among growers, who knew nothing about the enhancement of calcium, protein, and vitamin B3 (niacin). European settlers of the Americas centered cookery on kernels for corn pudding and succotash. They reserved canisters of cornmeal for ashcake, corn dodgers or hush puppies, johnnycake, mock oysters (corn fritters), and pone, all convenient travel food.

Wasting nothing, pioneers recycled cobs into smoking pipes and husks into dolls, mattress stuffing, and wrappings for tamales. A Southern breakfast tradition, ground hominy produced grits, a soft side dish flavored with butter or redeye gravy, a deglazing of country ham drippings with coffee. Tidewater Virginia contributed eggs and milk to corn bread recipes to produce spoon bread, a delectable side dish and showpiece soufflé.

In 1860, in preparation for the Civil War, Confederates boosted corn production from 30 million to 55 million bushels but faced increasing starvation as armies robbed farms of laborers and emancipation set slaves free. Rebel army cooks turned cornmeal or leftover pone into coush-coush, a breakfast stir-up of African origin. At Castle Sorghum on the Saluda River, South Carolina, a Union prisoner, Captain Willard Worcester Glazier of Albany, New York, reported meals of little more than corn cakes and molasses, the cause of chronic enteritis. By 1866, Southern cornfields lay scorched and weedy.

Reviving a Staple

Corn continued to serve new uses in the late 1800s, notably in amusement park and theater concessions, beginning in 1893 with a popcorn booth at the Columbia Exposition in Chicago. The heyday of cold cereals produced the cornflake, which vegetarian food faddist John Harvey Kellogg patented in Battle Creek, Michigan, in 1895. By 1911, shoppers faced 107 brands of cornflakes from which to choose.

In the 1920s, battered hot dogs on a stick rose to popularity as corn dogs, which vendors sold at the Texas State Fair in 1938. The corn-wrapped wiener also

gained fame as street food in Argentina, Australia, Canada, New Zealand, and Vietnam, where diners popularized baby ears and waxy corn, a gelatinous variety. In South Korea, roasted kernels soaked in boiling water produced *oksusu cha*, a naturally sweet corn tea touted as a treatment for diabetes and kidney disease. The Taiwanese favor grilled corn on a skewer topped with cayenne, garlic, onions, and soy sauce.

In the 1930s, corn became equated with poverty meals. Works Progress Administration artist Lowell Houser captured the beginnings of corn culture in 1938 on a mural for the Ames, Iowa, post office. The three panels pictured a Mayan grower and corn gods and an American picker centered with an emblematic corn kernel, stalk, and ear. Social novelist John Steinbeck's *The Grapes of Wrath*, filmed in 1940, depicted nomadic Okies fleeing the Dust Bowl and frying corn mush balls in grease as subsistence meals.

In the South, the Great Depression placed hardships on mountaineers, who made higher profits on distilled "corn squeezin's" (moonshine) than on corn sold as grain. To avoid federal revenue agents, "'shine" runners stripped cars to accommodate fast deliveries to city centers. Lionized in the 1958 movie *Thunder Road*, moonshiners' cars became the ancestors of NASCAR racers.

Hybridization of corn extended shelf life and, in the 1950s, increased sweetness, a discovery of Jerald K. Pataky, a plant pathologist at the University of Illinois. A decade later, Arthur Lee Hooker, a corn specialist at the same university, boosted resistance to rust fungus. In 1966, Frito-Lay of Atlanta, Georgia, and Memphis, Tennessee, the distributor of Fritos, invented Doritos corn chips, a snack fad adapted from tostados (toasted tortillas). In 1969, amylo maize, a unique cornstarch, coated food for the *Apollo I* spaceflight to prevent crumbs from permeating the atmosphere in the space capsule.

At 366 million tons (332 million metric tons) per year, corn dominates American farm crops. Of the three major grains worldwide—corn, rice, and wheat—corn accounted for 817 million, or 37.5 percent of crops, in 2009. During harvest, combines strip cobs from the stalk and husk and shell the corn, which provides 21 percent of the world's human food. The development of full popping and hull-less kernels satisfies the public's demand for an aromatic, easily activated snack, often cooked in a microwave oven. As a sweetener, corn syrup flavors more than 2,000 processed foods.

Indeed, according to Michael Pollan, author of *The Omnivore's Dilemma* (2006) and other acclaimed works on the modern food system, corn is a keystone of the American food industry. More than a quarter of the 45,000 items available in U.S. supermarkets, he maintains, contain corn—most of it cheap. Corn's overuse, he argues, is a direct cause of the growing problem of obesity in America.

See also: African Diet and Cuisine, Sub-Saharan; Agriculture; Aztec Diet and Cuisine; Plant Disease and Prevention; Prohibition; Snack Food; Standish, Miles; Swedish West India Company; Tortillas; Verrazzano, Giovanni da.

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[Cortés, Hernán de \(1485-1547\)](#)

With the Spanish conquest of Aztec Mexico in 1519–1521, Hernán de Cortés witnessed a unique culture capable of pitiless blood sacrifice and responsible for introducing chicle, chocolate, corn, pepper, and turkeys to the world.

A native of Medellín, Spain, Cortés studied classical languages and law at the University of Salamanca. During his work as a notary, he learned of Christopher Columbus's voyages to the New World and his return with potatoes and other culinary wealth. In 1504, Cortés departed for Hispaniola. At a village outside Santo Domingo, he received a colonial allotment of land and Taíno laborers. After establishing his reputation as a conqueror of Cuba and treasury officer for

the Crown, he advanced to colonial magistrate. While serving as mayor of Havana, he raised cattle and horses and dabbled at mining.

Much of Cortés's Central American experience appears in the history of New Spain and Mexico City compiled by infantryman Bernal Díaz del Castillo. Without permission from Holy Roman Emperor Charles V, Cortés set out for the Yucatán on February 19, 1519, with 600 soldiers and 20 horses. Upon encountering Maya, he hosted them with food and wine, a new experience for the Indians. Through trade, he acquired 20 Indian females from Tabasco to soak, hull, and grind corn for tortillas.

On March 4, the Spaniards burned their boats and marched inland from Vera Cruz with the aid of Cortés's mistress, translator Doña Marina, called Malinali Tenépal or La Malinche, who spoke Mayan and Nahuatl. His 150-pound (68-kilogram) mastiffs alarmed the Mexica, who raised only small Chihuahuas for meat. On Easter Sunday, the slave Cuitlalpitoc anticipated that the Spaniards would sacrifice and eat him. To his surprise, Cortés invited him to Sunday Mass and dinner.

Aztec Abundance

In mid-August 1519, the convoy moved west 200 miles (320 miles) toward Tenochtitlán, raising terror in natives by slaying citizens and burning property. After receiving gifts and foods from the Mexica allies, Cortés offered trinkets—beads, mirrors, needles, pins, and scissors. He angered the Indians by proselytizing them with Catholic dogma and by demanding an audience with Aztec Emperor Montezuma II. The Mexica deserted the Spaniards, leaving them to survive on shellfish and the remains of moldy ship's stores of cassava bread from Havana.

Cortés got a glimpse of New World foodstuffs from the next envoys. Some 50 Tlaxcalans brought him food gifts—beans, cherries and figs, corn cakes, fish, and roast turkey, an unfamiliar poultry breed to Castilians. As a grisly token of blessing, the Indians sprinkled the food with the blood of freshly slain Totonac boys. La Malinche warned that the carriers actually spied for the emperor to reconnoiter the camp and the military strength of men and horses. To refute

legends that the insurgents represented the plumed serpent god Quetzalcoatl, the envoys returned to Montezuma with news that the Spaniards acted like normal humans.

On November 8, 1519, Montezuma received the conquistadors with gold treasures and enough rations for several days. Cortés realized that Tenochtitlán was as populous as Córdoba or Seville, with perhaps as many as 200,000 people. He discovered the food wealth of the capital city in a huge farmer's market at Tlatelolco that was twice the size of the square in Salamanca. To feed so dense a populace, vendors offered 300 varieties of produce. To lure business, prostitutes smacked chicle (chewing gum), another unfamiliar New World product.

From Lake Xochimilco, farmers who grew peppers, corn, and tomatoes on *chinampas* (floating gardens) poled their goods through public canals. The agrarian islets yielded fruit and 50,000 tons (45,000 metric tons) of corn per year. For bartering and trade, merchants used cocoa beans as currency. For crises as deadly as the famines of 1450–1454 and 1505, magistrates stored corn in warehouses. In better times, citizens paid their taxes in beans, corn, and sage.

In a second dispatch to Charles V dated October 30, 1520, Cortés reported on the availability of birds and ducks, deer, dogs, and rabbits as well as *ollas*, pottery cooking jars. Apothecaries prescribed herbs and medicinal roots. Greengrocers stocked artichokes, borage, garlic, leeks and onions, nasturtiums, thistles, and watercress. Cortés cataloged honey, cherries, plums, sugar, and wine. Vendors displayed corn on the cob, cornmeal, and corn bread. While restaurants sold food and drink, diners on street fare ate bird and fish paté and eggs as well as cashews and peanuts. Cortés marveled at wells and a double water conduit into the city but found less appealing the idols shaped from ground legumes and seeds mixed with blood from the hearts of Aztec victims.

From Grandeur to Ruin

Montezuma received daily food service in grand courtyards, including his regular service of honeyed cocoa, which he drank as an aphrodisiac as often as 50 times a day. Cleanliness required the washing of hands before and after each meal and immediate replacement of used tableware. Some 400 young servants

brought dishes to the emperor and heated cooling platters over charcoal braziers. He ate along with courtiers and shared with five or six *el der ly caciques* (native chiefs) the entrées and peppery sauces from his own dishes. Choices ranged from poultry such as parrot, partridge, pheasant, quail, and turkey to the meat of boar, dog, iguana, and venison. Emulating Montezuma's table luxuries, Cortés's soldiers accustomed themselves to a leisurely breakfast at 10:00 A.M., when they ate two types of tamales, either honeyed or flavored with pimiento.

Following a rout of Spaniards from their headquarters at Tenochtitlán on June 24, 1521, and a loss of 600 conquistadors, angry Aztec rebels stoned their emperor for his complicity with the insurgents. Bringing reinforcements, Cortés attacked by boat over Lake Texcoco and began squeezing Tenochtitlán's supply lines. During an 80-day siege, the Aztecs rapidly depleted their stores of corn. After hunger, wounds, and rampant dysentery and smallpox sapped the city's citizenry of 100,000, the survivors capitulated on August 13, 1521, and fled the capital.

On October 12, 1524, Cortés led a two-year expedition to Honduras to colonize it for Spain. He provisioned the journey up the Tabasco River by 20 canoes relaying goods from caravels. At Cupilco Province, he found ample fisheries and cacao; at Chilapan, he arrived just as sweet corn was ripening. Along the long, swampy trail, his provisioners found either fresh or dried corn to feed the

[Recipe: Hot Cocoa, Aztec Style](#)

Bring 2 cups of water to a boil, add one seeded chili, and cook for a half hour. Remove the pepper. Warm 2 1/2 pints of cream, flavored with a cinnamon stick and 1 teaspoon of vanilla extract. On low heat, add 1/2 pound unsweetened dark chocolate and 2 tablespoons of honey. When the chocolate melts, remove the cinnamon stick and pour in the boiled pepper water. Top the cocoa with chocolate shavings.

troops and their mounts until they reached the rain-soaked trail beyond Ixtapan. For the rest of the mission, despair and hunger alternated with hope and plenty.

Upon Cortés's safe return, the Mexica greeted him with cacao, fruits, and turkeys and swept the road before him while showering him with blossoms. In

his fifth letter to Charles V, dated October 23, 1525, he described the hardships of overland marches and the meager rations at Teucix of cooked herbs, dates, and palm buds. At Taniha, he killed the pigs he brought along and ate unsalted pork with boiled palmetto and hearts of palm. Worsening relations with the Crown sent the expeditioner home in 1528, when Charles V demoted him to viceroy.

In 1530, Cortés retired to Cuernavaca to the palace he built upon returning from his expedition. While building ships, he cultivated sugarcane in new territory and erected a sugar mill operated by African slaves. Three years later, in the vessel *Concepción*, he explored the Pacific coast of Mexico and Baja, where he encountered Guaycura divers harvesting pearls from 30 oyster beds in La Paz Bay in May 1535. One of his introductions, Spanish grapevines, presaged the Central American wine industry. Cortés died of pleurisy in Seville on December 2, 1547.

See also: Biscuit; Díaz, Bernal; Mexican Diet and Cuisine; Pork; Religion and Food; Seaman's Diet and Cuisine; Tortillas.

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Crackers

A convenience and finger food baked from flour dough pressed flat, crackers provide grain nourishment in an easily stored and transported form. Whether salted or unsalted, leavened with bicarbonate of soda to reduce acidity or

unleavened, thin layers of dough rest for up to four hours to slacken gluten. In a hot oven, the flattened wafers bake quickly and uniformly. Perforations simplify the variance of size to suit dipping, eating in soup, or topping with a complementary food, such as cheese.

Over time, crackers have accompanied meals in the form of flatbread, pita chips, Passover matzoh, Eucharist host, teething biscuits, dehydrated sea biscuits, naan, and rusks. Small, hard biscuits derived from Mesopotamia as travel food made from oil, a small quantity of water, and ground acorns, bones, or grains. For military hardtack, Roman cooks double-baked *buccellum* (biscuit) to harden it for issuance to legionaries. As field pack food, the crackers traveled the Roman Empire, from Britannia to North Africa and Asia Minor.

Crackers in History

In the Middle Ages, crusaders carried crisp flatbread over long journeys from Europe to the Holy Lands. After 1189, Richard I departed on the Third Crusade with a “muslin biscuit” made from barley, bean, and rye flour. Soldiers returned home with recipes for plain or seeded Middle Eastern varieties, including Arabic *khubz* and Egyptian *dhourra*.

At the face-off with England by the Spanish Armada in 1588, Royal Navy recruits subsisted on a daily allotment of 1 gallon (3.8 liters) of ale and 1 pound (0.45 kilograms) of biscuit. This dreary diet continued until 1667, when navy provisioner Samuel Pepys added variety to ships’ pantries. Under Queen Victoria, the English soldier identified biscuit from the Royal Clarence Victualing Yard at Gosport by the Crown’s seal. Military bakers in Japan and Korea provided the same hard cracker as a long-lived ships’ staple.

Under less stringent circumstances, hardtack entered the diet of Hawaiians and Alaskans as common stores. Germans cut crackers into imaginative shapes to decorate Christmas trees. Yule wafers became the forerunners of alphabet-and animal-shaped crackers, designed to delight toddlers while they learned to chew solid food. Native American cooks enhanced the flavor of acorn and nut crackers with bear grease and duck or goose fat.

The Industrialized Cracker

During the codfishing and whaling era, the cracker industry became one of North America's first food industries. In 1792 at Newburyport, Massachusetts, John Pearson of Pearson & Son Bakery shaped flour and water into pilot bread, a flat, dry, tasteless ship's biscuit intended to remain edible at sea in galley pantries in all climates and temperatures. Before meals, the ship's cook soaked the wafers in milk, coffee, brine, or broth. Ships' doctors recommended sea biscuit as a digestive aid but joined the officers' mess for captain's biscuit, a more refined version of the sea dog's daily issue.

The concoction earned the name *cracker* in 1801 from Josiah Bent, a Boston baker who identified the crackle of cooling biscuits emerging from the oven, a sound reminiscent of firecrackers. His establishment distributed Crown Pilot Crackers, a lightly flavored wafer, as an accompaniment to New England clam chowder and to the fish houses of Canada's Maritime Provinces. Barrels of crackers followed pioneers west and satisfied the need for bar food in the frontier saloons of Denver and Pasadena. In 1822, a British brand, Huntley & Palmers of London, came to grocers' shelves in metal tins to prevent crumbling during coach travel. Cooks recommended lining tureens with crackers before ladling in broth and serving the mix to the sick and feeble.

Under factory conditions, the piercing of crackers with a docking stamp produced holes. The ventilation released pockets of steam formed in the dough by heat and facilitated an even shape, even for the hexagonal oysterette. Bite-size oyster crackers or water crackers originated in 1847 in the Trenton, New Jersey, factory of English immigrants Adam and John Exton as a crunchy accompaniment to soup and chowder.

A year later, competitor Ezekiel Pullen packed his Original Trenton Cracker or "OTC" in a wagon for sale door-to-door. In 1861, he supplied the Army of the Potomac with crackers sold in rounded lumps similar in shape to pretzel nuggets and served for breakfast and supper with salt pork and coffee. Soldiers, who called the wafers "McClellan pies" and "Monitors," bought private stashes from sutlers. Homemakers relied on saltines as a makeshift ingredient in appleless apple pie and other dishes created out of the few staples still available during war time shortages. On April 7, 1862, Mary Ann Bickerdyke, chief nurse and dietician

under General Ulysses S. Grant, assuaged survivors of the Battle of Shiloh with dwindling stores of crackers, tea, and whiskey.

Advances in baking technology increased productivity by rolling and stamping the dough. Although homemakers could shape their own wafers, by the 1870s, barrels of standardized crackers drew loafers and shoppers in general stores. In 1874, the Premium Saltine Company, with an automated factory in St. Joseph, Missouri, answered a demand for boarding house and restaurant accompaniments to salads and stews. In 1898, the Crown Pilot Company grew into the National Biscuit Company, maker of Nabisco snack crackers and cookies.

A Boston competitor of Crown Pilot Crackers, Educator Brand Crackers, came on the market in 1885. A dentist, William L. Johnson, formulated baking times for the whole-wheat dough to exercise teeth and gums. He contracted with Butler's Bakery in Newburyport, Massachusetts, to produce the Johnson Educator Cracker, which developed a fan base. By the twentieth century, the company distributed Beer Chasers, Butter Thins, Corn Meal Crackers, Diabetic Crackers, Kremex, Luncheon Biscuits, Scotch Chasers, Sea Pilots, Sesame Crax, Toasterettes, Vee-Gee Crax, and Wheatless Crackers among its 140 variants of the original dental stimulant.

Sold at the rate of a dime per pound, Educator Crackers were a godsend to the poor. Manuals on family nourishment mentioned Johnson's cracker by name as a chewable food for small children and a digestible accompaniment to cocoa. In 1894, the *Medical and Surgical Reporter* recommended a meal of cream and Johnson's crackers for rehabilitating patients.

The Modern Cracker

Crackers left factory conveyor lines in a variety of shapes and flavors, including beef broth, cheese, pepper, sesame, shortening, and coarse sea salt. Sealed in moisture-proof waxed paper, they remained dry and crisp. Caterers anchored hors d'oeuvres trays with crackers to hold egg salad, mousse, pâté, and seafood spreads. Saltier varieties accompanied bowls of soup and oyster stew.

In 1917, Russian Mennonites imported to Canada an unfamiliar child food, the teething biscuit zwieback, named for the German "twice baked." A brittle cracker,

zwieback acquired sweetness from the double oven time, which turned starch into sugar.

In 1923, Nabisco designer Sydney S. Stern created Ritz Crackers, a buttery scalloped disc that paired well with cheese and cold cuts. The inexpensive but filling food gained popularity during the Great Depression as a filler for meatloaf and beef stew or as a meal in itself spread with peanut butter, cocktail sauce, or evaporated milk, a common hobo food. In the late 1940s, crackers and other snack foods suited the eating style of prospering Americans. A healthful snack cracker in 1962 derived from Pepperidge Farm's distribution of Goldfish. In 2012, Nabisco, Pepperidge Farm, and Special K merged the qualities of the cracker with the chip.

See also: Finger Food; Hearth Cookery; Salad and Salad Bars; Snack Food.

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[Creole Diet and Cuisine](#)

From the settlement of Mobile in 1704 and of New Orleans in 1722, the Creole cuisine of Louisiana Territory evolved from the blending of African okra and Choctaw sassafras leaves (*filé*) with classic French and Italian gastronomy. In 1704, Governor Jean-Baptiste Bienville, father of both capital cities, imported 500 French orphan girls and undesirables, *filles à lacassette* (casket girls), as potential

mates for French soldiers. To introduce the females to cooking wild game and produce with Amerindian recipes, Bienville employed his Choctaw French cousin, Madame Langlois, to hold cooking classes. From the union of immigrant women with the first slaves, imported in 1719, came the first Creoles, the French-speaking free people of color who settled the Gulf of Mexico.

More elegant than rural, game-based Cajun food, haute Creole or native cookery began with roux, a sauce blended from flour fried in butter with broth or tomato pulp. The substantial essence, flavored by the chemical changes of the Maillard reaction (a kind of browning), turned fresh market staples—catfish, crawfish, grits, mirlitons (squash), oysters, peppers, pork, rice, shrimp, tomatoes—into multicultural entrées that emulated European originals.

Aristocratic without overwhelming the diner with tedious refinements, Creole dishes featured the savor of Greek, Portuguese, Spanish, and West African cookery, the tastes typically found in port cities such as Mobile and New Orleans. One model, jambalaya with ham, pepper sauce, and *andouille* sausage, yielded a riot of flavors and textures in one of North America's most spirited recipes. Another, chicory coffee, emerged from rationing after a blockade in 1808 halted shipments of coffee and cane sugar.

Creole style profited from the professional discipline, ingenuity, and intuition requisite to luxury. In the French Quarter of New Orleans, Antoine's, a restaurant founded on Rue Saint Louis in 1840, introduced *pompano en papillote*, fish steamed in a parchment paper bag. Before sealing the container, the chef soaked a fillet with velouté, a shrimp and white wine sauce laced with crab meat and flavored with a *bouquet garni* of bay leaf, parsley, and thyme. Patrons varied from prominent families to riverboat captains and their mistresses, a New Orleans-style juxtaposition of the sedate with the tawdry. To perpetuate Creole flair after the Civil War, Commander's Palace, a restaurant on Washington Avenue in the Garden District, trained a number of successful Creole chefs, among them current celebrity Emeril Lagasse and Paul Prudhomme, inventor of nouvelle Creole.

Creole tastes acknowledged the strand of slave cooking derived from the cultural memory of Africa and the bondsmen who passed through the Dominican Republic and coastal South America on the way to North America. Dishes featuring black-eyed peas, caramelized onion, sweet potatoes, pineapple, and

bananas, a Honduran treat introduced in 1866, flourished at the nineteenth-century hearths of convents, plantations, inns, and restaurants, particularly Arnaud's, Broussard's, and Galatoire's, a classic triad of New Orleans fare.

In 1880, a Bavarian immigrant, Madame Elizabeth Kettenring Dutrey Bégulé, opened a coffee house at the corner of Decatur and Madison streets in the French Quarter. There she introduced brunch, a relaxed midmorning repast that included court bouillon (poaching liquid) and cream-topped trifle, or bread pudding with whiskey sauce, suited to the unhurried lifestyle of New Orleans. Travelers found Creole menus in other cities—at Galt House in Louisville, Maison Dorée in New York, Maxwell House in Nashville, the Peabody Hotel in Memphis, and the colonial pavilion at the Paris Exposition of 1889.



Creole jambalaya—a slow-cooked rice dish of sausage, chicken, tomatoes, celery, onions, peppers, and spices—originated in the French Quarter of New Orleans, melding French and Spanish influences in a unique local style. (MCT/Getty Images)

In 1885, travel writer Lafcadio Hearn collected Creole flavors in his first compilation, *La Cuisine Creole: A Collection of Culinary Recipes, from Leading Chefs and Noted Creole House wives, Who Have Made New Orleans Famous for Its Cuisine*. That same year, the Christian Woman's Exchange issued *The Creole Cookery Book*, a generous list of soups, fish and shellfish dishes, sauces, poultry and meats, vegetables, breads and cakes, custards and puddings, and pickles. The

two anthologies testified to the centrality of cosmopolitan classics—Sicilian biscuits, trout à la Venitienne, turkey à la Perigord, *riz au laid*, ladyfingers, coffee custard—to family fellowship and to hospitality, the mark of well-bred gentry. In Natchitoches, fried meat pies sold door-to-door during the Great Depression enabled women to profit from the kitchen skills of original Spanish pioneers.

Creole specialties permeate modern American pop culture, beginning with Hank Williams's country classic "Jambalaya" (1952). Local dishes color fiction and film, from Tennessee Williams's play *A Streetcar Named Desire* (film, 1951) and Robert Penn Warren's *Band of Angels* (1957) to *The Big Easy* (1987), a noir crime movie rich in music, dance, and crawfish étouffée, and *Grand Isle* (1991), a screen version of Kate Chopin's feminist novella *The Awakening* (1899). Distinct from the southeastern gastronomy of the Gullah recipes of Charleston, South Carolina, and the Tidewater fare of Richmond, Virginia, original Louisiana Creole featured crowd-pleasing combinations—bloody bull cocktails preceding the gumbos and shrimp bisque served from steaming tureens along with side dishes of dirty rice, red beans, and sauce picante (a spicy tomato-based sauce). The serious diner topped off the meal with slices of pecan pie, bananas Foster, pralines, and beignets.

In the 1960s, Leah Chase, a purveyor of African Creole gastronomy, drew civil rights leaders to her Orleans Avenue restaurant, Dooky Chase. There, she created a meatless special for Lent, gumbo z'herbes, a puree of mustard greens, spinach, and turnips based on West African pot greens and the French *potage aux herbes*. Her establishment survived flooding from Hurricane Katrina in August 2005. After the deluge and a fire following Hurricane Ike in 2008, Brennan's on Royal Street, one of the famous Creole venues, resurged to popularity at Mardi Gras 2010. Nonetheless, the combined devastation wrought by hurricanes and the BP oil spill from April 20 to July 15, 2010, threatened the integrity of Creole ingredients, particularly coastal crab, crawfish, shrimp, and oysters. Gulf pollutants left aficionados fearful for the future of an American food phenomenon.

See also: Boré, Jean Étienne de; Cajun Diet and Cuisine; Grilling; Moravian Diet and Cuisine.

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Crusaders' Diet and Cuisine

A series of Christian military expeditions from the eleventh to the fourteenth centuries to recapture the Holy Land from Muslims, the Crusades introduced European armies to the biota and foods of Asia Minor and Africa and to the spiced dishes common to the Near East. The culinary shift occurred at a time when both the upper classes and peasants invested more than half of their income on food and beverage and when farmers paid their bills and taxes in foodstuffs. After the launch of the First Crusade in 1096, tens of thousands of foot soldiers experienced a broadening of tastes and cuisines.

First Crusade

Organized by Pope Urban II at Clermont in southern France in August 1095, the crusaders left Europe on August 15, 1096. The huge endeavor produced unforeseen changes in the wine industry. Some nobles abandoned their vineyards to monasteries in exchange for ongoing prayers from monks for victory over the Saracens who ruled Jerusalem. Other landowners left vineyards in their wills to churchmen who prayed for their salvation in the afterlife. Within three centuries, Cistercian brothers managed Europe's largest grape-growing territory.

On the First Crusade, the Christian forces departed in the midst of famine without adequate food, a problem that perpetually threatened a badly or ga nized siege on Islamic territory. While supply trains imported dried fruit and starchy staples—barley, beans, chickpeas, lentils, and wheat—some 3,000 miles (4,800 kilometers) to the Middle East, Christian soldiers passing through Champagne and Rouen outraged French Jews by their demands for donated supplies. German provisioners, led by Walter Sans-Avoir, and Franks commanded by Godfrey de Bouillon bought food from Byzantine sellers in Hungary and Bulgaria to feed troops on the way to Constantinople.

A year later, produce and meat sellers along the route to Jerusalem either offered goods at inflated prices or refused to sell to an army of strangers in exchange for foreign currency. Peter the Hermit, leading 40,000 crusaders, bargained for lower food prices and negotiated with the Byzantine Emperor Alexios I for imperial “hospitality” and donations.

More fearful of starving than of the attacking Turks, the men of the First Crusade spread into the Balkans and raided markets for their immediate needs. According to William of Tyre, in October 1097, newcomers to the eastern Mediterranean area foraged around Antioch in northern Syria for 30 weeks for edible plunder—Sidonian wine, Palestinian olive oil, Syrian grain, Galilean dried fish, Sicilian bacon and tuna, Jerusalem honey, Tyrian sugar, cheese, and yogurt. Anselm of Laon added pepper to the list of troop necessities of bread and candles.

After crusaders captured Antioch, eyewitness Raymond d’Aguilers described in his chronicle how troops from Provençal continued to live off local supplements throughout the cold months of 1097 and 1098, when Saracens cached their pantries and retreated to caves. In a gloomy winter of famine and epidemic typhoid fever, the Calabrian Prince Bohemond, Robert of Flanders, and Tancred of Normandy led 20,000 raiders, who excelled at foraging for cattle, corn, fodder, and wine along the Orontes River through Lebanon, Syria, and Turkey. Others sailed for Cyprus in search of provisions. Supply ships from Europe arrived at the ports of Joppa (Jaffa in present-day Israel) and Nicaea (İzmit in present-day Turkey) with only enough sustenance to maintain crusaders for short periods.

Troops, inured to cookery far from Europe, adapted their tastes to local rations and styles of preparation and seasoning. In 1099, Fulcher of Chartres recalled how

Frankish troops marching through the Holy Lands staved off hunger by chewing sugarcane, which the Arabs had cultivated since 700 C.E. As a result of hybrid cookery, international trade spread Arab cuisine to the West, notably honey cakes and *lebkuchen* (sweet cake), the forerunners of gingerbread, a staple of German Easter pastry.

On his deathbed in spring 1118 from eating spoiled fish from the Nile River, the Frankish general Baldwin, who became King Baldwin I of Jerusalem, so trusted Egyptian spice that he ordered his cook, Oddo, to embalm and return his remains to Jerusalem for interment. Oddo gutted Baldwin's corpse and seasoned it with spices, salt, and balm of Gilead (also balsam) for the return journey. The corpse remained incorrupt until its burial.

Second and Third Crusades

In 1147, at the beginning of the Second Crusade, English fishermen and yeomen from Bristol, East Anglia, Hastings, Kent, London, and Southampton set out from Dartmouth in 164 ships. At Adalia, Turkey, in January 1148, crusaders paid outrageous prices for Byzantine foodstuffs. According to historian Odo of Deuil, because of malnutrition and exhaustion, soldiers died at a rapid rate from an unidentified epidemic, possibly bubonic plague or typhoid. Those fleeing the pestilence met their end from Turkish attacks. The few who survived, as well as some 10,000 turncoats who accepted posts as Muslim mercenaries, began to adopt Moorish dress, domestic life, medical practice, and cuisine, settling in Sicily and as far west as Spain.

Upon their return to England, veterans incorporated eastern Mediterranean fare into British cookery. Eleanor of Aquitaine, the queen of Henry II and a veteran crusader, enhanced the royal pantry at Winchester with almonds, cinnamon, cumin, and pepper. Later in the century, London merchants stocked Babylonian palm oil, pepper, spices, and Mediterranean wines. From northwestern Sicilian markets at Palermo came melons, lemons, and oranges as well as figs, pine and pistachio nuts, pomegranates in syrup, and tahina paste made from roasted and ground sesame seeds.

Hildegard of Bingen, a Rhineland Benedictine abbess, incorporated aromatic

plants, spices, and wines in her *Physica (Medicines)*, an herbal handbook. The text advised correct dosages of simples (herbs) for disease:

Herbs & Spices	Ailments Treated
cinnamon	malaria and soreness
cloves	head cold, hiccups, septic wounds, and edema
cumin	lung congestion and heart pain
fennel	nausea and sore eyes
galangal	palsy, back pain, and reflux
ginger	weak eyes and constipation
horehound	deafness and sore throat
lavender	liver pain and chest congestion
licorice	intestinal complaints and hepatitis
nigella	ulcers and flatulence
nutmeg	halitosis and depression
pepper	pleurisy and a diseased spleen
sage	excess phlegm, fungus, and senility
thyme	scabies and leprosy
zedoary	tremors and snakebite

By the Third Crusade, assistance from the Armenians and Turks raised spirits for the Christians' march through Asia Minor. By relieving crusaders of foraging duties, the volunteers restored the European ranks to full strength. During the siege of Acre, Israel, initiated against the Arab Saladin, a Kurdish general from Lebanon, by the French knight Guy of Lusignan on August 28, 1189, food arrived by sea to Haifa on an erratic schedule.

By late February 1191, scurvy-ridden crusaders were feeding on grass, bones, and meat from their depleted mounts. King Richard I of England, known as Richard the Lionheart, arrived in early June with ample food and weapons to supply his army until July 12, when it starved out the Muslim garrison at Acre. During Richard's initial dealings with Muslims the previous month, Saladin treated him to sherbet (granita), a flavored ice made from fruit puree and snow.

War in the Thirteenth Century

For the 1203 conquest of Constantinople during the Fourth Crusade, initiated by Pope Innocent III in 1201 and begun on June 24, 1202, Italian Christians chose food marketing over piety. Crusaders found Genoan, Pisan, and Venetian moneylenders eager for commerce via trading vessels. Two historians, Robert of Clari and Geoffrey de Villehardouin, exonerated the Venetian Doge Enrico Dandolo of greed for trying to balance a contract market economy thrown awry by 12,000 soldiers marching through the Republic of Venice. The livelihood of fleet commanders and provisioners hung in the balance as West fought East for possession of the Holy Lands.

Fortunately for investors, control of the African and Asian spice trade passed from Constantinople to Venice. Trade in old spices—pepper and saffron—and new spices—aloes, cinnamon, cloves, cumin, nutmeg, and powdered rhubarb—as well as sugar and suckets (candied citrus fruits) made Venetian merchants on the city docks phenomenally wealthy.

The push into Alexandria, Egypt, in 1204 revived the question of where and how provisioners would buy necessities. Frankish soldiers robbed and raided markets unmercifully to make up for past hunger and sickness. In 1205, King John of England extended Queen Eleanor's shopping list with imported cloves, ginger, nutmeg, rice, saffron, and sugar, an expensive commodity used to make medicines and syrup for preserving fruit.

During Louis IX's bivouac along the Nile in February 1250, in the third year of the Seventh Crusade, Muslims at Al Mansurah (Mansoura), Egypt, cut off 80 Christian supply ships. Louis's troops relied for food on burbot, a scavenger fish that fed on corpses. As the French army retreated to Damietta at the Nile River delta, the supply convoy carried away some 25,000 knights sickened by their makeshift rations and by scurvy and dysentery. For treatment of casualties returning to France, encyclopedist Vincent of Beauvais, Louis's chaplain, prescribed cinnamon and pepper as cure-alls.

Living Among Arabs

Throughout the 174-year crusader residency in the eastern Mediterranean, the sanitary lifestyle and lavish diet of the Arab elite astonished English, Frankish, and German soldiers, some of whom languished from scurvy and malnutrition, intestinal parasites, dysentery, malarial fevers, trachoma, and food poisoning.

Servants in Arab households arranged a variety of meats—boar, deer, hare, partridge, and quail as well as beef, goat, and mutton—on painted lusterware platters. Fresh herbs grew wild—fennel, fern, mint, parsley, rue, sage, and thyme. Arab banquets featured ample vegetables—artichokes, asparagus, cabbage, lettuce, pickled turnips, spinach, and truffles. Cooks stuffed onions with fruit and lentils, flavored lamb with peaches and turmeric, baked eggplant with allspice and currants, fried cheese fritters, simmered lamb in mint and pomegranate juice for soup, filled dates with cardamom and coconut, and spiced other dishes with cinnamon, coriander, cumin, ginger, mastic, and pepper.

Residents refreshed themselves with snow-chilled sorbet, semolina pudding, and shredded pineapple frozen with rose petals and sugar. From Mamluk glass beakers and footed Persian beverage cups, diners sipped herbed mare's milk and drinks made from pureed apricots, bananas, citron, dates, figs, grapes, lemons, oranges, pomelos, and quince, the fruit of Damascene orchards. After-dinner trays offered apples, cherries, pears, pomegranates, and walnuts.

In Egypt, the nexus between Far Asian trade into the Red Sea and Middle Eastern kitchens, the reign of Saladin unified Arabic cookery with disparate elements from Egypt, Iraq, Lebanon, and Syria. Iraqi cuisine tended toward simple foodstuffs heavily flavored with sweet and savory additives—spices, sugar, and oil and vinegar. From Lebanese merchants trained in India, European crusaders learned how to cultivate sugarcane and extracted dry crystals from its juice for food and medicine. By the twelfth century, most of Europe imported sugar from the Middle East.

The maritime force that patrolled trade routes from the Red Sea through the Mediterranean derived from the Fatimid dynasty in Egypt, which dominated trade and demanded custom duties from the Catalanes, English, French, and Germans. The revenues proved so lucrative and steady that the Christian Church, although leery of commerce with Muslim infidels, began to view food traders as respectable for their contributions to the compounding of cough syrups, painkillers, and cordials, used as tonics for the heart.

Arab Cuisine in Europe

The English began incorporating Levantine and Sicilian dishes into their diet between 1100 and 1135. New spending on luxuries gave rise to a merchant class, whose profits on foodstuffs produced envy in aristocrats. In the mansions of the rich, imported anise, caraway, cardamom, cinnamon, clove, coriander, cumin, garlic, ginger, mace, mustard, nutmeg, pepper, saffron, and turmeric brightened the flavors of familiar recipes. One example, the standard English porridge, acquired glamour as frumenty, wheat cereal boiled in milk and flavored with spice, fruit, and sugar or honey as a sweetener.

New plants and taste treats bombarded European palates. The Duke of Anjou returned from Syria with the damson, a fruit originally called “Damascene.” Italian vendors and Muslim traders in Sicily and Spain, the conduits for Eastern foodstuffs, enriched themselves on the flow of Mediterranean goods from the ports of Jerusalem and Alexandria. John Adrian made a fortune from imported cinnamon, dates, and gingerbread. Along with a wider choice of harmoniously seasoned foods and distilled beverages, according to the inventories in the Testament of Count Eudes de Nevers in Acre (1266), crusaders imported to their homelands elegant table settings, sophisticated utensils, flamboyant carving and serving styles, and dining manners suited to conspicuous consumption.

Religious leaders acquired balm, a gum resin burned as incense for Christian services and valued in hospices for

[Recipe: Medieval Frumenty](#)

Remove the hulls of 1 cup of wheat kernels by crushing in a mortar. Add the cracked grain to 4 cups of water, 1/2 cup of milk, and 1/2 cup of cream. Simmer for 15 minutes. Cover and let the mixture rest. When the grain softens, stir in 4 teaspoons of honey, two egg yolks, and a pinch of nutmeg. Add 1 cup of raisins, currants, stewed apricots, or stewed prunes and a pinch of saffron for color. Serve with fish or venison.

treatment of pain, coughs, and abrasions. English distributors, known as

pepperers and *speciarii* (spicers), compounded aromatics at herb shops and *spicerias*. With the adoption of Arab distilling equipment, the trade evolved into the establishment of pharmacies in Boston, Lincoln, London, Lynn, and Southampton. Robert de Montpellier, royal apothecary-spicer to Henry III, opened London's first pharmacy at Cheapside in 1245, where he stocked pynada (ground pine nuts) and colored sugar flavored with attar of roses and violets for making hippocras (spiced wine). City spicer John Adrian made a fortune from the sale of imported cinnamon, dates, and gingerbread.

By 1299, the English demand for exotic dyes and flavorings resulted in an offering of 53 kinds of spice as well as pine nuts and Morocco and rock sugar at the Boston Fair in Lincolnshire. The recipe for *viande Cyprus* (Cyprus meat) called for stewed chicken prepared with dates, Cyprus sugar, cinnamon, pine nuts, rice flour, and sweet wine.

The Countess of Leicester kept estate spices locked in the wardrobe. Henry III, her brother, sent guards from Winchester to purchase dates, figs, and raisins. In 1264, Henry's queen, Eleanor of Provence, ordered a saucery built in the upper story of Windsor Castle. The income from an almond, spice, and Cyprus sugar monopoly at the St. Giles Fair at Winchester supported the Benedictine priory of St. Swithun. At St. Ives in Cornwall, 20 spice boutiques flourished throughout the 1280s. Mediterranean food additives became so costly that recipes numbered them, such as ten white peppercorns, a dozen cloves, or eight saffron curls.

See also: Byzantine Diet and Cuisine; Crackers; Famine; Pan-European Diet and Cuisine; Spices; Sugar and Sweeteners; Travel Food.

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[Culpeper, Nicholas \(1616-1654\)](#)

The English naturopath and populist author Nicholas Culpeper enhanced seventeenth-century understanding of holistic nutrition and curative foods as elements of alternative medicine.

Born in Sussex on October 18, 1616, and trained in Greek and Latin and in herbology by his maternal grandfather, Culpeper completed his education at Cambridge. His family disowned him for rejecting a degree in theology in favor of medicine. After apprenticing with a druggist at Bishopsgate, he opened a pharmacy in Spitalfields outside London's East End. Culpeper developed a hatred for supercilious physicians, who kept secret pharmaceutical knowledge to extort fees from the ignorant. He maligned pompous doctors as "bloodsuckers, true vampires." His enemies lambasted him with charges of drunkenness, fraud, and lechery.

With botanic specimens gathered in the countryside, Culpeper treated the indigent at a rate of 40 patients per day. He chose the freshest plants for food and medication and stored preserves in clay pots. His simples, or vegetable treatments, included the cooking of beans and peas with savory (*Satureja hortensis*) to ease flatulence and the sipping of barley water to reduce fever and pain. Culpeper advocated ample vegetables in the diet, especially asparagus, carrots, and parsnips, which sucked minerals from the soil into their roots. His respect for dandelion greens and duck

[Recipe: Easter Cake](#)

For postholiday cleansing of the body, Nicholas Culpeper advised the baking of tansy cake: "Add seven beaten eggs to a pint of cream, the juice of spinach and of a small quantity of tansy pounded in a mortar, a quarter of a pound of Naples biscuits [sponge cakes made from ground pine nuts], sugar

to taste, a glass of white wine, and nutmeg.” After thickening the mix over low heat, the cook placed it in a cake tin and baked it in an oven.

meat derived from their cleansing of the urinary passages. He also believed that cooking with bay leaves diminished cyclical headaches and that cherries and mint sparked appetite. Moderating his success, the Society of Apothecaries inveighed against clinical herbalism as “white witchcraft,” a benevolent form of sorcery.

In 1643, during the second year of the English Civil War, Culpeper practiced combat surgery and translated medical texts from Latin to English. His intent was to supply ordinary people with handbooks, notably *The English Physitian* (1652), a best seller in Britain and its colonies. He followed that with *The Complete Herbal* (1653), a guide to home cookery to treat common ailments, such as bittersweet for vertigo, beets for stuffy nose, vinegar for whitening teeth, and mustard to combat lethargy.

On January 10, 1654, while recuperating from a shrapnel wound to his left shoulder incurred at the siege of Reading, Culpeper died of the combined effects of tuberculosis, smoking, and overwork at age 37. His concern for women’s travails in *A Directory for Midwives* (1651) earned him the title “Father of Midwifery.” The Culpeper chain of herb shops still flourishes today in India and the United Kingdom as well as on the Internet.

See also: London Virginia Company; Mustard; Peppers.

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Curative Foods

In oral tradition and medical writing, folk cures are a mainstay of preliterate and uneducated peoples. From prehistory, culinary advice advocated flavorful foods that prevented and treated disease.

Honey, the original health food, gained respect because it required no digestion, preparation, or additives. Theoreticians from Zenon to Dioscorides advised the mixing of honey in foods and beverages to prevent scurvy and treat surface wounds. In Egypt papyri as early as 3500 B.C.E., lists of healing compounds extolled honey and characterized it as a respiratory aid, perhaps because it soothed raw mouths and throats and quieted coughs. Around 2000 B.C.E., Mesopotamian patients chose between the surgeon and the *asu* (herbalist), both of whom valued honey as a foundation of medicines. The Vedas, Sanskrit scriptures begun in 1500 B.C.E., contained prayers to the mother herb and relied on ghee (clarified butter) mixed with honey as an alimentary soother. Around 60 B.C.E., the Roman poet Lucretius found honey helpful in the treatment of infants.

Ayurvedic Diet

In prehistoric India, healers recognized cooks as allies. From 3000 B.C.E., India developed Ayurveda, a unified dietary system featuring wellness as its goal. Essential to Ayurvedic recipes, yogurt and ghee balanced energy with nutrition. The Upanishads, the mystic Vedas, bolstered wellness through fresh vegetables, the basis of health. To maintain stamina, Hindu house wives found ways of combining fruit, grain, legumes, and vegetables with herbs and roots, notably *ashwagandha*, a stress reliever, and *ramacham*, a purifier.

Ayurvedic texts promoted paired foods. Recipes featured palatable choices and

advised plating hot servings in reasonable proportions to prevent gluttony. Families sought harmony in table atmosphere and chewed slowly to direct nutrients to needy parts of the body. In 1000 B.C.E., Ayurvedic texts compiled recipes for fragrant oils and restorative menus. At Varanasi around 800 B.C.E., Sushruta, a surgeon and clinician of Ayurvedic healing, compounded a butter-honey skin dressing that cleansed wounds. For purifying the body, cooks focused on greens and stews that combined dal, herbs, and rice, with vegetables.

Chinese Therapeutic Diets

Simultaneous with the rise of Indian Ayurvedic healing, Chinese herbologists focused on herbs and healthful staples. Around 2695 B.C.E., the Emperor Shennong (Shen Nung), the “Father of Chinese Medicine and Pharmacology,” systematized consumer shopping and summarized the benefits of produce and condiments. A vegetarian, he combed the countryside for palatable healing ginseng and tested on himself the effects of ma huang tea and medicinal mushrooms. In a treatise, *Pen Tsao Kang Mu* (Chinese pharmacopoeia), he warned cooks of such plant poisons as aconite and mandrake. In 1122 B.C.E., aides of the Emperor Cheng Wang interviewed dietitians to superintend the imperial diet.

A collection of health lore and superstitions from the Zhou dynasty, the *Tao Te Ching* (*The Classic Way*, ca. 300 B.C.E.) named the nutraceuticals (nutritional pharmaceuticals) of the Chinese savant Laozi (Lao Tse). His philosophy of eating for longevity stressed the addition of herbs, mushrooms, nuts and seeds, and seaweed to greens and steamed root crops.

In medieval Asia, practicality outweighed arcane methodology. “Diet doctors” confirmed the consensus that spring rainwater and a hearty folk diet served the body better than the overdressed fare of court feasts. In 1368, Chia Ming, an aged politician from Zhejiang (Chekiang) Province, published *Essential Knowledge for Eating and Drinking*, a directive to the Ming dynasty on long life and health through preventive diet. Chinese culinary historian Li Shih Chen listed 1,800 hot and cold herbs and offered homemakers 18,000 recipes in *Compendium of Materia Medica* (1578), the outgrowth of a lifetime of research. From these beginnings, Chinese kitchen cures of the early twenty-first century maintain a

dependence on such natural foods and beverages as *tang kuei* for female reproductive health and *ho shou wu*, an organ energizer.

Mediterranean Cures

Along the Mediterranean shores, domestic and monastic publications featured *gestivos* (digestive compounds). In 1550 B.C.E. at Luxor, Egypt, the Ebers papyri named chants and herbal dosages that improved blood flow to the heart. Recipes featured pantry staples—dates, grain, honey, milk, and oil—as well as cardamom, garlic, sesame seed, and tamarind, all beneficial to metabolism. The thorough study of restorative foods mentioned fenugreek and onions to relieve swelling, dill and beer to ease depression, and licorice to combat bloating and dyspepsia. The compilers showed special interest in causes of blindness, for which they prescribed roasted ox liver and pigs' eyes.

The first Greek clinical advisories advanced from food choices to meal preparation. Around 550 B.C.E., the Samian mathematician Pythagoras of Croton, the “Father of Vegetarianism,” set the example of health foods for his community of disciples. He developed a strict code of exercise and meatless fare. His faith in healthful meals echoed that of a contemporary, Siddhartha Gautama (later, the Buddha), who promoted peaceful well-being with a ritual meal of milk and rice.

Greek dietitians educated Romans on fragrant unguents to stem disquiet and the preparation of liver to cure night blindness arising from a vitamin A deficiency. Imperial chefs prevented senility by serving watercress sprinkled with vinegar. After 54 C.E., the Emperor Nero trusted healing foods to preserve his talents. For singing and speaking, he commanded a daily serving of stewed leeks to shield his larynx and broaden his vocal range.

Roman encyclopedist Pliny the Elder, the compiler of *Natural History* (ca. 77 C.E.), amassed a range of data on a healing diet. He cited a recipe for frogs that healed diseased eyes and named lettuce and onions as deterrents to insomnia. He quoted Cato on the choice of curly cabbage over smooth for maximum energy. Pliny valued physic garden staples, particularly holly berries and ivy, and respected mead, but he reserved his strongest praise for grapes as “creating more for our benefit even than for our pleasure.”

Medieval Herbology

In the early Christian era, monks and nuns cultivated plants as sources of food and treatment for the sick. They grew meadowsweet and dandelion alongside rhubarb, a dependable body purifier. For *De Cultura Hortarum (On Gardening, ca. 840)*, Walafriid Strabo, a Frankish monk, researched fresh and dried plants at Reichenau Abbey on Lake Constance. His poetic descriptions pictured both fennel and pennyroyal as jolting energy to the intestines. Of the melon, he described the gush of juice and seeds as a delightful refreshment. For the treatment of ills, he prioritized cures for the stomach, the “king of the body.”

Around 1140, St. Bernard of Clairvaux echoed Pliny and Strabo in relying on common herbs as inexpensive, easily tolerated cures for ailments. During a malaria outbreak, Bernard warned Italian Cistercians that pharmaceuticals threatened health and violated vows of poverty because of their high cost. His pointed comments hinted at disrespect for Benedictine monk-physicians, who violated the stoic philosophy of forbearance with their fraudulent medicines.

In homes, the treatment of invalids and the enfeebled fell on house wives. Into the Renaissance, women prepared meals and nostrums in the kitchen, the female nerve center of the house. Physic beds grew the leaves and fruits for broths, cordials, infusions, and tonics. A common gift to guests and travelers, even possets of valerian promised untroubled sleep. The thrifty offered a glut of fresh and dried plants and roots for barter and sale or for distribution to the poor during epidemics.

American Frontier Curatives

When immigrants reached the New World, Amerindian shamans demonstrated oral traditions of 200 plant curatives, including willow bark and mayapple. In the Carolinas and Georgia, native doctors compounded bitters in oil to pour into the ear canal to ease stiff joints. The Cheyenne healed fevers with decoctions of black cherry and purple coneflower. For soothing digestion, medicine men prescribed a dish of wild yam or pokeweed greens; wild blueberries and sassafras tea heightened stamina and alertness. Native cooks taught pioneers to respect New

World biota and their powers of nutrition and cure, including juniper tea for scurvy and blue cohosh for women's reproductive ills.

South of the Rio Grande, Indian cooks fermented agave hearts into *pulque*, an Indian beer that served as a standard analgesic for adults and children. In Mexican deserts, pulque rehydrated the body and sharpened senses. Throughout the Southwest, pioneers relied on whiskey to quiet suffering and ease labor pains. Food cures were as close as a blackberry or elderberry bush or a pot of collard greens or dish of sauerkraut. Oatmeal water alleviated rash and sunburn. A single clove bud anesthetized an abscessed tooth.

Into the twenty-first century, folk dieting holds out hope against catastrophic ills as virulent as pancreatic cancer and as insidious as brain tumors. Regimens tend to extremes—such as protein but no carbohydrates or raw fruits and vegetables to the exclusion of gluten and white sugar. Physician-made menus ban hydrogenated fats and alcohol as well as red meat and prohibit smoking. Ironically, the health conscious often return to the curative dishes of the ancient world—raw vegetables and fruit juices and pure water from springs.

See also: Culpeper, Nicholas; Jacobean Diet and Cuisine; Lapérouse, Jean François Galaup; Liebig, Justus von; Lind, James; Physic Gardening; Pliny the Elder; Polo, Marco; Seacole, Mary Jane; Seaman's Diet and Cuisine; Seaweed; Shellfish; Taro; Theophrastus; Tofu; Virginia Company of Plymouth.

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Curing

Since ancient times, the processing of fish, fish roe, and meat by smoking, marinating, or dry rubbing with rock salt and sugar plus nitrates or nitrites has preserved fats and proteins and prolonged their use over long winters and hard times. In Babylonia, Greece, and Samaria, rock salt gained prominence in trade as a meat preservative. Around 590 B.C.E., Chinese sausage makers approached curing with a more complex recipe. They added bean sauce, ginger, green onions, and pepper to salted minced goat and lamb to produce a long-lived fermented sausage. For slaves, the curing of a onetime kill or fish seining extended wild game usage over months instead of days. The process suited the saving of a variety of game, from duck, hare, gazelle, and reindeer to smelt and whale blubber.

The Romans followed the curing principles of author Cato the Elder's *De Agricultura* (*On Agriculture*, ca. 160 B.C.E.) and regulated pork curing with guidelines to protect the consumer. In the next century, the poet Varro reported that the Roman taste for cured meats fueled a thriving import business in Gallic ham. Julius Caesar's legionnaires, who dined on Gallic dry sausage, spread the popularity of cured meat throughout conquest lands. A recipe from the early empire listed honey, mustard, rock salt or saltpeter (potassium nitrate), vinegar, and water as a brine to preserve cooked meat.



A curemaster examines one of hundreds of raw hams coated in salt and brown sugar for aging in a cold curing facility in North Carolina. After curing for up to six months, the hams absorb flavor from a wood-fired smoker and then age for several months longer. (MCT/Getty Images)

The French continued to lead world production of preserved meats. Cooks evolved charcuterie, or pork preservation, for convenience. Curing increased the shelf life and storage stability of fresh pork as bacon, confit (coated meat), forcemeat, *galantine* (deboned stuffed meat), ham, *pâté* (meat spread), or terrine (meat loaf). Variety suited the French flair for adaptable foodstuffs that made appealing table presentations.

Drying and Smoking

Much of meat curing involves extracting fluids. Smoking combines dehydration of moist external tissue with the fumigation of insects and extermination of microbes in beef and pork, cheeses, haddock and salmon, malt whiskey, nuts, prunes, salt, and tea. The Romans mixed pork sausage with garlic, onions, and pepper before stuffing into casings for smoking to shrink the finished product.

Salt containing streaks of nitrate produced the most appealing pink tint.

Along the North Sea, medieval fishing crews turned smoked herring and stockfish into an industry. Despite the need for soaking, herring became the most popular pickled species for Scandinavian smorgasbords. Canada's Grand Banks and New England made a similar bonanza from rack-dried flounder and hake and from salt cod, which they marketed in eastern South America, West Africa, and the West Indies. By drying and salting fish, dealers drew out excess water, reducing the weight of their unscaled catch by up to 80 percent and simplifying packing and transport. The processing also softened pickerel and shad and made them easier to fillet. Restaurants served cured fish with potatoes as a means of balancing the salty taste.

Variance of heat sources permeated tissue with such identifiable flavors as applewood and mesquite in the United States and alder and oak, the choice for curing European lamb. Other substances—animal dung, aromatic spruce boughs, corncobs, peat, sawdust, whiskey-soaked hardwood chips—imparted unique flavors, whether applied at low or high temperatures in the closed quarters of a metal chamber smoker or walk-in smoke house.

Cured Foods

A number of regional dishes evolved from cured specialties, notably Alaskan eulachon (candlefish), Chinese Jinhua ham, Egyptian *batarekh* (mullet roe), Romanian pastrami, Ecuadoran ceviches, Italian prosciutto and Toscano ham, Virginia ham, Faeroe cured mutton, Icelandic gravlax, Mexican shark and shrimp, and tender Montreal brisket. Brazilian cured poultry, a rarity among national preserved meats, defeated problems with salmonella, the main threat of chicken and duck sausage. Spanish Serrano and Iberian ham, made from rustic pigs, gained such a reputation for dry curing that the country currently produces some 40 million hams annually.

In the southeastern United States, the evolution of native barbecue in Texas and the Carolinas enabled the underclass to elevate cheap cuts of meats and their unique sweet-and-sour sauces to signature dishes. In the Appalachian hill country of the Carolinas and Georgia, families salted pork chins (backbones) in

wood barrels and boxes in the proportion of 8 pounds (3.6 kilograms) of salt to 100 pounds (45 kilograms) of meat. The addition of 2 ounces (57 grams) each of black and red pepper and 1 quart (0.95 liter) of molasses plus borax to kill blowflies resulted in a mountain staple, salt-and-pepper ham. Some hung the cured meat in cloth bags; others buried it in cornmeal, hickory ashes, or shelled corn, all of which absorbed briny runoff.

Meat Processing

Nineteenth-century butchers increased the penetration of brine or stabilizing nitrite pickle by injecting solutions into animal muscles or arteries with a perforated needle. To prevent gray areas and soured meat near the bone, industrial food processors enhanced circulation of curative liquids by piercing a haunch with a rank of needles. By hand massaging or tumbling the meat, the processor broke down membranes and increased distribution of the pickle or marinade throughout tissues. In 1917, George F. Doran patented the first U.S. nitrite curing process, a system that enhanced meat savor.

Sausage, a Hungarian and Polish delicacy, derived its texture and taste from salt and vinegar, which slowed oxidation and the growth of bacteria. German sausage makers boosted the flavor with juniper berries and branches on the cook fire. French guilds developed techniques of preserving coarsely chopped salt pork as forcemeat pressed into intestinal casings. To ensure quality, makers inserted pieces of former batches into the mix to inoculate bacteria.

Butchers sold sausage in two forms, uncooked and cooked or ready-to-eat. More refined chopped meat required baking in a mold as pâté or terrine, which chefs served cold on antipasto platters along with boiled eggs, pickles, and raw vegetables. Similar delicacies, the galantine and roulade involved pounding poultry and rolling it in skin for poaching in liquid.

Sugaring with dextrose, honey, lactose, or corn or maple syrup altered the flavor of streaked pork belly to produce bacon. Cooks buoyed the bacon industry by serving the meat boiled or fried, by sprinkling bacon bits on salads and baked Idaho potatoes, and by using it to lard pheasant, roasts, and venison or to wrap around blander meats, including meat loaf and scallops. A leaner cut, Canadian

bacon, or back bacon, comes from the boneless pork loin.

More invasive of the taste and appearance of meat than flavorings, nitrates and nitrites suppress *Clostridium botulinum* spores (which cause botulism) and oxidation and enhance the color of red tissue. U.S. Food and Drug Administration studies of the formation of nitrosamines in 1972 established that bologna, corned beef, hot dogs, pepperoni, and salami contain carcinogens that can cause leukemia in children and colorectal cancer and emphysema in adults. Nonetheless, smoked meat still accounts for 30 percent of the U.S. meat market. In October 2011, the World Cancer Research Fund continued to warn that consumption of 50 grams of processed meat per day upped bowel cancer risk by 20 percent.

See also: Amerindian Diet; Barbecue; Jerky; Pemmican; Pork; Salt; Sausage; Smoked Food.

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Currency, Food as

By association, food currencies have, from ancient times, allied the exact worth of edibles with other commodities, from land to armor and weapons, boats, slaves,

and wives. For the Babylonians, barley equaled cash; for Mongolians, tea bricks liquidated easily into currency. Far to the north, Norwegians entered the Middle Ages with an economy based on butter and dried cod.

The cannibals of Borneo, Ecuador, and Peru retained human skulls as money and shrank the craniums to make them easier to carry. New Guinean women arrived at markets with bundles of banana leaves, the indispensable cooking sheaths that flavored pit-roasted meals. In Japan and the Philippines, into the seventh century C.E., shoppers carried purses of rice until copper coins replaced grains as money. After the establishment of the West Indian cane fields in the eighteenth century, barterers in Barbados, Jamaica, and the Leeward Islands bought goods with leaf tobacco, twists of chewing tobacco, and loaf sugar.

The variety of foods used as money derives from local tastes and available commodities, such as pemmican among Amerindians, corn as “country money” in colonial New England, and tulip bulbs, the edible commodity that saved the Dutch from starvation during World War II. In ancient Russia and Scandinavia, Sami and Siberians paid blood money, bride prices, court fines, and taxes with cheese and reindeer. Farther west, Caucasians used cattle or oxen as cash, a system paralleling the trade in livestock among the Anakalang, Lamboya, and Lauili of Sumba, Indonesia. At Darwaz, cakes of dried mulberry, leaf tobacco, sugar, tea bricks, and vodka equated as Afghan currency. As late as 1917 and the end of the Romanov czarist dynasty, isolated Russian peasants exchanged pots of jam for goods and services.

African Commodities

African vendors bartered with cowrie shells and feathers as well as kola nuts and salt cakes or cylinders. In the 600s B.C.E., Egyptians determined bridewealth in household goods as well as livestock. Negotiated between the bride’s father and the groom, the *shep en sehemet* (marriage contract) determined the types and amounts of gifts that would cement a social and political union of families that suited male ambitions.

After 500 C.E., the coconut contributed another form of food currency, which spread across the Mediterranean and Polynesia as far north as Kaho’olawe,

Hawaii's smallest island, and south to the Nicobar Islands. Food assets stabilized familial relations and ensured that the bride could count on a long marriage untroubled by desertion or nonsupport.

Before coinage in sub-Saharan Africa, Kenyan, Madagascan, Tanzanian, and Ugandan traders set their monetary standards on the worth of cattle and goats as well as grain and beer. Other folk currencies included spotted peas, salt, and tobacco in the Cameroon; gin and yams in Nigeria; brick or slab salt in Abyssinia, Ethiopia, Mali, and Zambia; and camels and millet among the Somali. Guinea established a unique economy based on black pepper and rice; Liberia relied on palm kernels and oil. The Sudanese bartered with millet, onions, tobacco, livestock and poultry, and salt bars. Libyans became the only African traders to value corn as money.

Edible fish and mammals supported currencies readily converted into meals. Mozambique traded in a wide variety of goods, including dogs, ducks, and chickens. In the 1930s, Lord William Malcolm Hailey, a supervisor of British colonies, foresaw the depletion of pastures from too many animals penned up in readiness for trade. In his treatise *African Survey: A Study of Problems Arising in Africa South of the Sahara* (1938), Hailey proposed to rescue arable land by replacing livestock money with coins incised with individual likenesses of cows and goats to indicate worth; however, the imposition of a symbolic coinage failed to eradicate the centuries-old system. Even in the 1980s, Angolans lost faith in the *kwanza* currency and regressed to trade in Beck's, Heineken, or Stella Artois beer.

Salt Money

Because of the necessity of salt to humans and domesticated animals, traders from China and India to the Black Sea, Burma, and New Guinea traveled salt routes across deserts and seas and used salt in barter to even out swaps. Mine slaves on the Dnieper River delta who set ocean water to evaporate in shallow depressions lived a miserable existence as caustic substances inflamed their eyes, lungs, and skin. Into the Iron Age at Cheshire, East Anglia, Salinae, Teeside, Tyneside, and Worcestershire, British salt making provided granular currency

through grueling labor.

History provides scenarios in which slaves turned salt into cash. In 1275, Marco Polo observed salt boiling along the Yalu and Yangtze rivers and, in Tibet, the stamping of salt cakes with the khan's imperial logo, which set the value at 2¢ each. Mid-fourteenth-century travel writer Ibn Battuta of Tangiers compiled eyewitness accounts of Malian salt makers evaporating brackish water and loading salt slabs on camels for trade at Walata, in southeastern Mauritania.

After the Romans abandoned the *pecus* (cow) for other forms of *pecunia* (money), their carters wore a trail known as the Via Salaria (Salarian Way) to the artificial port of Ostia for trade throughout the Mediterranean. Their goods served soldiers as *salarium argentum* (salt money), a salt allowance that doubled as cash in remote parts of the empire. Additional evidence of salt money in Abyssinia, India, and Tibet suggests a widespread buying power of the food additive. From sharp-eyed dealers came the equal-armed *libra*, or balance-beam scale, a device that weighed salt and other food money via gravity in a *bilanx* (paired pans), source of the word *balance*.

From Salt to Spice and Cocoa

By the fall of Rome, the world shifted away from grain and salt to the more lucrative spice trade, the economic fulcrum of the Middle Ages. In 410 C.E., Alaric I ransomed Rome in exchange for 1.5 tons (1.4 metric tons) of pepper, the prime ingredient in Gothic sausage. By 412, his Visigoths set up an annual pepper tithe of 300 pounds (140 kilograms). Exchange in the lightweight grains made transport easy to places where the exchange rate advanced to higher profits than Alaric could expect from ordinary plunder.

New World money systems similarly relied on easily borne edible currency. After 1000 B.C.E., the Olmec cultivated cacao, which originated along the Amazon and Orinoco rivers. By 100 C.E., the Aztec and Maya revered cocoa beans as aphrodisiacs, food, money, and symbols of deity. The Aztecs of Guatemala carried purses of cocoa beans to farmer's markets to buy beans, bread, and meat. Wealthy Mesoamericans guarded screw-top jars filled with chocolate patties, their money in the bank.

In 1519, Spanish conquistador Hernán Cortés recognized government control of cacao planting as a means of halting inflation. At Aguadulce, Panama, customs agents guarded the local treasury, which was stacked with bags of cocoa beans. In 1712, Brazil's economy maintained the food currency system by paying military salaries in cocoa beans as well as cloves, sugar, and tobacco. Guatemalans continued carrying the beans as pocket change, along with eggs, another transportable exchange medium.

In Ireland, trade in females as currency suited a primitive Druidic society. The arrival of St. Patrick in the 400s B.C.E. introduced a Christian humanity that forbade enslavement. To replace bondage as money, before 465 C.E., the Irish accepted the *Senchus Mor*, the law code of St. Benignus, who compiled tables of equivalents. According to his calculations, the former price of one woman equaled 5,184 wheat kernels, 72 sheep, 18 heifers, or three cows. The agrarian monetary system dominated barter until the advent of metal coins in the 700s.

See also: Animal Husbandry; Chocolate; Manioc; Pemmican; Salt.

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Curry

A cooking tradition based on coriander, cumin, and turmeric, curry encompasses a complex food culture from Pakistan to Southeast Asia. Curry derives from the

mortars and pestles of Mohenjo Daro, a settlement in the Indus Valley dating to about 2600 B.C.E., where tamarind pods, cumin, fennel, and mustard were ground into a cooking powder. A bit farther north, their contemporaries, the Harappans, harvested cardamom, pepper, and turmeric, which they added to the region's gastronomy. By 1700 B.C.E., the beginnings of curry cuisine reached Sumer, where temple cooks offered spiced meat to the god Marduk.

The term curry, which originally meant "sauce," entered English in *Forme of Cury* (*Forms of Cookery*, ca. 1390), compiled by the chef of Richard II. Etymologists surmise that the word crossed the spice route from India, first as the Tamil word *kari*, translated into English as "cury." To Indians, curry identified a pungent or astringent gravy made in the pot juices of fish, fruit, herbs, legumes, meats, spices, and vegetables. To the English, curry was an additive to a finished dish.

Curry actualizes the Ayurvedic concept of balancing hot with cold and wet with dry, a dietary method once used to boost intelligence and to treat diabetes. Recipes incorporate the vibrant taste and aroma of roasted whole spices into vegetable, fish, and meat dishes served with flatbread.

Across Asia, curries vary in flavor and degree of heat. The Telugu cookery of southeastern India generates fragrance and intensity with combinations of anise, bay leaf, black pepper, chilies, cinnamon, clove, nutmeg, and leaves of the Indian curry tree (*Murraya koenigii*). A more distinctive taste derives in Bangladesh and Bengal from additions of mustard and poppy seeds. In southwestern India at Karnataka, cooks temper spice with coconut and jaggery, an unrefined cane sugar. The dairy-based fare of Kashmir calls for more piquant ghee (clarified butter) and a yogurt and rice base.

Other variants typify regional curries, such as the garlic and tomato dishes of Pakistan, the ginger and onion flavors of Punjabi cuisine, and the simpler, unenhanced foodways of the Pashtun around Kabul, Afghanistan. The Tamil of Sri Lanka broaden their cookery with the tastes of central India plus fenugreek, rosewater, and tamarind, a sour fruit pulp. Indian recipes influence Chinese entrées, which temper peppers and onions with hot sauce and soy sauce. Burmese curries tend toward fresh onion and chili paste. Japanese curry favors the taste of pickled vegetables and spices purchased in brick form. The subtle essences of Kaffir lime and lemongrass combine with shrimp paste and tamarind in

Indonesian meals. The Vietnamese render curry as a soup flavored with cilantro and green onions. In Samoa, curry is a luxury spice enlivening bland breadfruit or taro.

From centuries of exploiting Asian conquests, the British established their own version of curry, a mongrelization that continues to raise issues of political correctness. The taste first tingled their mouths in the seventeenth century with the exploits of the British East India Company. In a historic cookbook, Hannah Glasse's *The Art of Cookery Made Plain and Easy* (1747), Asian recipes listed only coriander and pepper as elements of curry. Later editions included ginger and the traditional yellow of turmeric, but not hot chilies.

In the early 1800s, indentured Indian nationals worked colonial plantations in Africa, the Caribbean, and Southeast Asia. For a taste of home, they carried with them stashes of curry powder. At each site, locals adapted Indian flavorings to local foodstuffs, such as the rum that West Indians added to curry sauce.

By 1837, Lea & Perrins, a British-made liquid condiment fermented by apothecaries, offered a curry additive and appetite stimulant in simple drop form known as Worcestershire Sauce. Not until Isabella Mary Beeton published *Mrs. Beeton's Book of Household Management* (1861) did British curry achieve its savory bonanza from the addition of allspice, cayenne, cinnamon, fenugreek, and mustard. The collection recommended that cooks obtain seasonings in powder form from a spice shop.

Through colonial fusion cookery, curry influenced the beef and seafood restaurants of Guyana, Jamaica, Tobago, and Trinidad. A German invention, currywurst dates to the cookery of house wife Herta Heuwer in postwar Germany in September 1949, when city workers removing the bombing rubble bought street food for lunch. The recipe involved the spicing of slices of grilled pork sausage with curry ketchup and curry powder, a cult snack featured by wayside food trucks and stand-up snack shops in Berlin.

By the 1950s, British curry sauces also incorporated fennel, paprika, raisins, and vinegar. In the following decades, cookbooks, magazines, travel guides, and gourmet clubs encouraged experimentation with regional Indian gastronomy. Snack trays displayed hearty curried finger foods—shrimp satay, spicy cheddar bites, curried corn fritters and deviled eggs, and lamb wontons. In May 1991, English gourmand Pat Chapman, a noted food writer, issued the first Curry

Awards to England's top curry restaurants. One venue, Madhu's Southall in Hilton Park Lane, London, won the award in 2001, 2004, 2006, and 2007.

Nutritional studies of the twenty-first century have examined the bioactivity of curcuminoids found in turmeric. Research links curry with the control of arthritis and the prevention of the protein plaque that causes Alzheimer's disease and the carcinogens that generate colorectal cancer. Unlike pharmaceuticals, which overtax the liver and kidneys, curry produces no known side effects.

Practitioners of Ayurvedic medicine value the curry leaf for stimulating the digestive and immune systems and alleviating inflammation and the disfigurement of psoriasis. Additional claims of muscle regeneration, protection from pesticides, treatment of cystic fibrosis and sexually transmitted disease, and antimetastatic action against breast tumors and skin cancer currently boost dietary use of Indian cooking styles dating back 5,000 years.

See also: Fast Food; Heritage Foods; Lunch; Mustard.

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[Cussy, Louis, Marquis de \(1766-1837\)](#)

Culinary writer and food historian Louis, Marquis de Cussy, respected cuisine as a microcosm of human experience. Born to wealth, he ran an exacting Paris kitchen. Fine cooks gravitated to him for his command of roasting and sauces,

which he dubbed “enlightened chemistry.”

The chef vilified the stultifying menus of classical Greece and Rome and disdained the decorative fare of the court of Louis XIV. Instead, he touted the expertise of middleclass Parisian caterers, especially in preparing spring and summer vegetables. His political observations credited the Reformation as a backlash of Christians against too many Catholic fast days. Among his regrets, he named the fragmentation of the French wine country during the revolution of 1789.

Cussy squandered a fortune on a gracious table decked with fine food. His weekly dinners accommodated no more than 11 guests. He based quality cooking on mushrooms in dry wine and regarded truffles as the “diamonds of the kitchen.” His table behavior began with abstemious portions and sips of liqueurs and halted before he reached satiation. He declared that he could cure gout easily through such controlled diet.

Cussy’s first coup as a celebrity chef came from the patronage of Marie Antoinette. From attendance on her table, he presented French royalty specialty chicken dishes, which he basted solely with butter. He honored the *jésuite* (turkey) and regaled tablemates with the history of a Paraguayan turkey imported by Jesuits for the wedding feast of Charles IX and Elisabeth of Austria in 1570. Cussy’s praise of rivals established his interest in food done right rather than building his own reputation. In 1804, at age 38, he entered the household of diplomat Charles Maurice de Talleyrand, a noted gourmand, as pastry chef under head chef Boucher.

During his rise to prominence, Cussy served Napoleon I as palace prefect. The emperor was indifferent to food and expected unscheduled meals of cutlets and roast fowl, with hot coffee served at the table rather than in the salon after dinner. He especially appreciated the chef’s innovative kidney bean salad in oil. Cussy honored Lent with a favorite onion soup, which required the frying of tiny bulbs in butter to a hint of gold. He finished the dish with a bit of sugar, broth, cognac, and buttered bread for thickener. The soup preceded his favorite combination, salmon with asparagus.

Cussy served the emperor as escort for the Empress Marie Louise to Vienna. Upon returning to the Tuileries, he discovered his patronage at an end following Napoleon’s political demise at Waterloo in 1815. Cussy won a pardon as a

Bonapartist from Louis XVIII by soaking the king's strawberries in champagne and cream.

On his deathbed, Cussy chose his favorite poultry, red partridges, as a last meal. He surveyed food history in "L'Art Culinaire," issued in an 1843 compendium, *Les Classiques de la Table (Table Classics)*. He showcased his dishes in sparkling prose, the hallmark of a new era of table conversationalists and food writers. Among the chef's beliefs towered a faith in gastronomy and hospitality as emblems of a nation's greatness.

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Customs, Food

Food preparation lies at the core of many of the world's folk and religious customs—for example, the sharing of *syllabub*, a sweet brandy punch with whipped cream on top that Charlestonian cooks ladle into cups at Christmas; the mischievous pouring of tea down the backs of diners at a Laotian New Year's banquet; and the festive cinnamon cup that Nazareth's Arab women steep and serve visitors to a birthing chamber. Newfoundlanders cook a jiggs dinner of salt beef and peas pudding to serve at a scoff, a gathering for eating, dancing, singing, and storytelling.

The Eid al-Fitr, a three-or four-day celebration of the end of Ramadan, begins at dawn with dates or another sweet fruit before Muslim prayers for forgiveness and mercy. Devout Bangladeshis, Burmese, and Fijians take their sweet fruit with milk and spaghetti. A gathering of friends and relatives in Tunisia begins with special biscuits and baklava. Saudi Arabians distribute gift candy to children and deposit rice and staples at the doors of the poor.

Kitchen preparations commonly accompany and enhance life passages. In India, women cater to pregnant women by preparing tempting dishes equal to the number of months of pregnancy. The extra kitchen work readies the mother for bearing a well-rounded baby or for a peaceful passage to the afterlife if she should die in childbirth. In Indonesia, cooks steam rice and spread a *rijstaffel* (rice table) to celebrate a first birthday. At funerals, the Laguna of New Mexico expect food sharing. Clan members spread a table to feed grave diggers.

Food from the Gods

For religious rituals, food preparation and service typically follow age-old formalities, a culturally stabilizing influence. In India, Hindus sing hymns that characterize the importance of sacral meals and the soma plant to healing and wellness. In the *Vajasaneya Samhita* (Black Vedas, ca. 600 B.C.E.), a prayer for food supplies a pantry list of common staples:

May for me prosper, through the sacrifice, milk, sap, ghee, honey, eating and drinking at the common table, plowing, rains, conquest, victory, wealth, riches. May for me prosper, through the sacrifice, low-grade food, freedom from hunger, rice, barley, sesame, kidney beans, vetches, wheat, lentils, millet, panicum grain, and wild rice.

Prose liturgy advises the worshipper on rites to win the heart of the god Brahman to ensure a pantry supplied with a variety of edibles.

Tradition links special dishes with the propitiation of gods as though they were banquet guests. In Sanur, Bali, barefoot women prepare festal bowls of fruit, duck, and rice cakes. In procession, they move toward one of the island's Buddhist temples bearing heavy loads on their heads. At Tulikup, Bali, a similar religious parade ends a 3-mile (4.8-kilometer) walk to the Indian Ocean, where participants join in the yearly purification of the sea. At the completion of their honorarium, they share the bowls of delicacies.

In China, Confucius, a sixth-century sage, recognized an earthly need for preparing and sharing dishes. He respected good cooking and elevated cuisine to prime importance as a social unifier and harmonizer. He believed that group rituals teach virtue. Like the Hebrew Passover and the Christian *agape* (love feast), Chinese temple ritual required communal sampling of food platters. In his

Analects, Confucius insisted that the meals be fresh, flavorful, and properly blended. He spurned fussy manners and showy banquets in favor of well-cooked peasant entrées of polished white rice, finely chopped meat, and sauce.

Chinese Customs

A festive time for the Chinese occurred over an extensive celebration of the Lunar New Year, a tradition eventually shared by Japanese, Koreans, Malaysians, and Vietnamese. For a month, the Chinese rested and displayed affection and forgiveness in the form of conversation. Because servants went home during the holiday, families stocked pantries with easily prepared goods for themselves and callers. With their tea, they served their favorite spring roll or egg roll, which got its name from the season of the year it marked.

During the Ming dynasty, which began in 1368, cooks shaped dumplings like gold coins to guarantee prosperity. Other foods acquired significance for puns on their names: *lin ngau* (lotus root), which sounds like “every year there will be abundance”; *hoe see fat choy* (dried oysters in seaweed), a homophone for “good business” and “prosperity”; *saang choy* (scallops stir-fried with lettuce), a soundalike for “growing fortune”; and *yu* (fish), a play on the word *desire*.

New Year cookery requires planning for the wide array of sweet cakes, lychees and candies, and main dishes chosen for their color and shape, such as green spinach and snowpea shoots to symbolize money and round buns to resemble coins. Chinese homemakers shape bite-size dumplings and pot stickers and mold moon cakes with a bean paste filling, scalloped edges, and an embossed symbol of the moon goddess. They harmonize table presentations with shades of red and gold, symbolic of luck and wealth. Eating an entire fowl traditionally promotes wholeness; fish advances prospects of marriage.

Asian Holiday Preparations

New Year’s cuisine has influenced other parts of Asia as well. Because the Tet holiday means a time of rest, Vietnamese cooks prepare ahead *banh tet*, a boxy rice cake encasing mung beans and pork and wrapped in banana leaves. In

Malaysia, families pickle vegetables, a chore prefaced by the grinding of spices and slicing and blanching of root crops, which Chinese immigrants eat at the New Year and island Muslims serve at Ramadan.

In Japan, New Year's calls for drying shiitake mushrooms and pounding rice for *mochi* (glutinous rice) desserts in advance of the holiday display of three large round cakes. On New Year's morning, house wives serve red rice and special taro soup, also cooked the night before to prevent having to light the stove on a holiday. In the afternoon, relatives visit to feast. In place of an old-style house-to-house procession, celebrants gather at one table. On the last day of the seven-day holiday, cooks make seven-herb soup for supper. The next morning, they reduce the menu to tea and beans. On the fourteenth day after New Year's, the cook shapes mochi into squares and rectangles and puts coins into round cakes that hang on branches in the kitchen and stable and on the front door. For distant kin and friends, house wives send gifts of mushrooms, rice, and mochi.

Mediterranean Food Ritual

In ancient Greece, celebrants of the grape offered food at altars dedicated to wine making. For the late February feast of Anthesteria, a first flowering and coming-of-age ritual, Athenian worshippers honored Dionysus, the god

[Recipe: Panspermia](#)

Soak a handful each of common beans, lentils, peas, corn, and bulgur wheat in water overnight. Parboil in fresh water for ten minutes. Drain, add fresh water, and cook for an hour. Sweat two cloves of garlic and one large chopped onion in olive oil. Mix the ingredients, adding 1 cup of red wine and enough water to cover, and stew for 45 minutes. Add the juice of one lemon, pepper, and sea salt and bring to a boil. Serve with toppings of snipped dill or parsley and more lemon juice, bread, and cheese.

of wine, and his son Pan, a goat-footed sprite. The holiday immortalized Ikarios,

the introducer of wine in Attica whom Dionysus transformed into a star. The period gave its name to the month of Anthesterion, the time of flowering and of unsealing and tasting the new wine.

Activities began the first day with the opening of the *pithoi* (wine jars). On the second day, libations poured from the 3-quart (2.8-liter) *khous* (pitcher) preceded heavy imbibing. On the third day, the devout stewed fruit in a large earthenware casserole and carried the dish to the altar to pour into a pit. The fruit pleased Hermes, the messenger linking the living with the dead. Another dish, *panspermia*, a honeyed gruel of vegetables and grains, treated deceased ancestors and honored the Earth Mother.

In the style of its Greek neighbors, Italy produced its own cookery customs based on family and community values. In Abruzzo during the Renaissance, the celebration of family milestones and such patriotic and religious occasions as the feast of Saint Antonio of Abate on January 17 and the distribution of *panis benedictus* (holy bread) on the first Sunday in May coincided with an all-night festival known as a *panarda*. The spread of 30 to 60 courses—traditional antipasti, herbed omelets, pasta, fried fish and game, sausages, cheese and bread, and desserts—a long with complementary wines demanded that women work rapidly to preserve freshness in ingredients. Served to men only, the food bash included singing and celebrating.

New World Feasting

In the seventeenth century, culinary history acquired the written observations of Europeans newly arrived in the Americas. In the Peruvian Andes, poet and chronicler Garcilaso de la Vega's *Comentarios Reales de los Incas* (*The Royal Commentaries of the Incas*, 1609–1617) summarized native behaviors from an aboriginal perspective. His people's rivals, the Huanca of the Xauxa River valley of Peru, worshipped dogs, which native cooks raised, fattened, and sacrificed at ritual feasts.

Quechua-speaking natives shared their foodstuffs with the less fortunate. To aid the hungry, house wives or ga nized a food collection feast. Before pouring mugs of *chicha*, a ritual corn beer flavored with berries, the hostess brought

baskets and draped a serape or poncho on the veranda to receive donated staples. At the end of the drinking fest, the needy homemaker joined in a thanksgiving prayer and gathered items to store in her kitchen. The principle of gift giving respected fate and reciprocity: “Today, this is for you; tomorrow, it may be for me.”

In the southeastern United States, the Cherokee liquefied a caffeinated black drink from parched holly (*yaupon* or *dahoon*) leaves, the main beverage at an annual Green Corn Dance. Because the bitter tea purged the stomach, bladder, and liver, the black drink centered purification rites, which concluded with steaming the body in a sweat lodge. Similar cleansing rituals employed emetic beverages prepared by Alabama, Creek, and Huron practitioners. European colonists attempted to add the black drink to their diet but abandoned it in favor of tea and coffee.

In the Massachusetts Bay Colony, the Puritans of Boston arranged to feed the family without violating the Sabbath. To ready dishes on Saturday evenings, they filled the bean pot, a lidded ceramic casserole settled near the dying fire at sundown. Its bulbous shape enhanced the mingling of bean flavor with layers of salt pork and molasses. The building of brick ovens added to the one-dish meal other slow-cooked regional specialties, including berry cobbler; pandowdy, a deep-dish sweetened apple dessert; and slump, savory stewed fruit with biscuit topping.

See also: Holiday Dishes and Festival Foods; Idiocuisine; Polo, Marco; Tea; Tea Ceremony.

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D

Dairy Food

Dairy products derive from processing the milk from buffalo, camels, cows, goats, horses, llamas, reindeer, sheep, yaks, and zebras. Because of the refreshing taste and high nutrient content of milk products, cultures such as the Khoikhoi of southern Africa, the Masai of East Africa, and Tunisians of North Africa value dairy foods, either raw or cooked, as integral parts of national diet and cuisine. The dairier's efficient use of the environment sustains the pastoral life, even on unpromising soil, such as that of northern Greece, the Australian interior, and the Navajo herding lands of the Four Corners (Arizona, Colorado, New Mexico, and Utah).

After neolithic hunter-gatherers in Germany, Iraq, and southeastern Turkey shifted from nomadism and a heavy wild game meat diet to raising domestic animals around 9000 B.C.E., they discovered the value of herding and dairying as a steady, reliable source of food. The symbiotic relationship between humankind and herd advanced in 8000 B.C.E., when herders in India raised zebu for meat and evolved dairy foods from cows. Transport, which began with knotted skins, improved with the use of bladder and stomach bags introduced by the Tuareg of the Sahara and the nomads of Anatolia and the Caucasus. In Iran, innovations to the New Stone Age diet advanced the taming of goats as herd animals, as pictured in colored frescos of milking and churning cream into butter, a luxury food. Balearic Islanders and Corsicans advanced coagulation with fig tree sap and thistle buds; the British used bedstraw. Farther west, Berber *smen* (fermented butter) in North Africa became the basis for frying other foods.

Originally a Sumerian product of buffalo, camel, cow, ewe, goat, reindeer, or yak milk, yogurt coagulated naturally in the pouches that nomads shaped from sheep stomachs as early as 6000 B.C.E. By the 1600s B.C.E., Hammurabi II regulated dairy sales as stringently as he did butchering. Blended with wild herbs for Balkan sour soups and in bulgur (cracked wheat) and millet balls, the

combination of yogurt with other flavors appealed to the Fulani of Nigeria.

Historic Innovations

Where goats, horses, and sheep adapted to rough terrain, female dairy maids developed other milk variants that diversified Middle Eastern cuisine. Russians sipped liquid yogurt like buttermilk. Scythians, according to the Greek historian Herodotus, invented koumiss, the world's first fast food, from curdled mare's milk. They maintained a stable of lactating mares to produce milk for a fermented drink valued as an aphrodisiac and cure-all.

Buddhist, Hindu, and Jainist scripture set the tone and style of the peasant diet with ghee (clarified butter), an emollient integral to anointing and burial rituals. Ghee appeared in the Akkadian-Sumerian *Epic of Gilgamesh* (ca. 1800 B.C.E.) and in India and Pakistan in the Rig-Veda (1200 B.C.E.) as a skillet lubricant and fuel for holy lamps. The milk solids, smeared on bread, produced a simple daily meal. Heritage foods from the early Israelite culture in 1200 B.C.E. centered on barley bread and dairy items from goats and sheep. In Homeric Ionia, the invention of the woven rush cheese strainer facilitated the removal of whey from soft goat curds. In the *Iliad* (eighth century B.C.E.), a healer grated cheese into restorative Pramnian wine during the Greek siege of Troy.

Around 800 B.C.E., the Baudhayana Sutra, a collection of manuals on behavior, warned the Hindu devout to keep silent, sit with crossed legs each evening, and eat sparingly of grains and dairy products, both easily digested. For sacramental gifts, the devout purchased milk products rather than meat, which Hindus denounced for causing death to animals that would otherwise continue producing nourishing dairy food.

Pastoral Cuisine

People in temperate zones relished dairy products unavailable in tropical climes, primarily because there were no meadows for pasturing herds. In India, cooks turned to milk and chickpeas to make halvah, a dense confection suited to

hospitality and dinner parties. In China from 200 B.C.E., cooks mixed rice with frozen milk for an early sherbet. Romans mocked Iberian cooking with butter and based Italian meals on smoked Ligurian and Tuscan cheese wheels with *punicum* (flatcake) paired with olives, a Mediterranean staple. Gala dinners ended with gelato, a honey-and snow-based dessert and forerunner of Renaissance ice cream in Arabia, Egypt, France, Iraq, and Syria.

Early medieval dairiers in Benedictine and Cistercian monasteries in the Alps and throughout northwestern Europe preserved artisanal cheese making, including Port du Salut, named for an abbey. Monk-made milk products surprised Charlemagne with the sharp taste of molded sheep cheese. The monks' recipes favored compressed curd products as a substitute for forbidden meats and extended their shelf life by brining, cellaring, drying, or smoking. According to the Avesta (ca. 530 C.E.), the Zoroastrian scripture composed during the Sassanid dynasty, the prophet Zarathustra lived on cheese for two decades to prepare for his ministry. In Ireland, the devout honored Saint Brigid with spreads of dairy foods and gorged on milk products, eggs, and meat before Lent. The eleventh-century medical school dietary guide *Regimen Sanitatis Salernitanum* (*Code of Health of the School of Salerno*) treated depression with dairy products. In Poland, ice houses extended the shelf life of fresh butter, milk, and yogurt as well as of cheese rounds, which peasants used in lieu of cash to pay church tithes.



A Tibetan nomad milks a yak at a pasture in Qinghai Province, China. Tibetan nomads make their living from livestock and their products, which also form an integral part of the herders' diet. (*China Photos/Getty Images*)

In the late thirteenth century, Marco Polo cited popular recipes of nomadic Mongolian hunter-gatherers. Lacking settled farmland, they relied heavily on the milk of ewes and mares. He described fermented milk as a pleasant drink that satisfied his hunger. In 1215, Genghis Khan credited koumiss, yogurt made from mare's milk, with boosting the efficiency of his soldiers, who conquered Mongolia. Polo's dictated writings described sun-dried milk as an on-the-march paste consumed by the Tatar forces of Kublai Khan from 10-pound (4.5-kilogram) packs. In the 1500s, Spanish colonists added milk products to the largely vegetarian Aztec regimen. Contrary to tastes in Catalonia and Provence, chefs in central France enamored of butter added it in one-third of their recipes.

Haute Cuisine, Desserts, and Processed Foods

Following the popularity of simple clabber among highland Scots and whey

drinks in coffee houses in the mid-1700s, sweet French dessert cheeses and festive custard and berry ice cream in London cookbooks migrated to the colonial tables of Benjamin Franklin, Martha and Thomas Jefferson, Dolley and James Madison, and George and Martha Washington. Haute cuisine, a product of the early 1800s, introduced the European bourgeois to new versions of dairy products—*crème fraîche* on lobster bisque and asparagus soup, powdered milk in caramels, and *smetana* (sour cream) on Russian borscht. Dessert tables featured English clotted cream topping lemon tarts and varied cheeses and ripe pears at the end of the meal.

Winter dairying and industrialization boosted the application of milk to processed goods year-round. In 1832, Russian chemist M. Dirchoff streamlined the drying of milk for commerce. After French inventor Nicolas Appert condensed milk in 1820, Gail Borden's production of canned milk in vacuum pans in 1856 and the invention of pasteurization in France in 1862 enlarged the pantry even more with stable, safe milk and dairy products. The Civil War popularized sweetened condensed milk as a standard field ration, which remained fresh because sugar prevented spoilage. By 1872, dairier William Lawrence sold America's first cream cheese under the Philadelphia brand. Three years later, the world's first industrial dairy opened in Normandy, augmenting the reputation of the French as global cheese masters. Long-distance refrigerated trucking linked an increasing number of consumers with perishable dairy goods.

Concern for purity drove the infant food industry, which got its start before World War I. Parents demanded the testing of dairy herds for staphylococcal and tuberculin pathogens. Consumers petitioned governments to curtail the watering of raw milk and the preservation of dairy products with borax and formaldehyde.

For the Dairy Division of the U.S. Department of Agriculture, microbiologist Alice Catherine Evans researched microbes in milk and cheese. In 1917, Evans tested milk directly from the udder to prove that the *Bacillus abortus* in fresh milk spread brucellosis, or undulant fever, in cows, goats, and humans. For more than a decade, she campaigned to upgrade the dairy industry by informing doctors, public health authorities, veterinarians, and dairy farmers of sepsis in milk. Universal pasteurization became an industry standard in the 1930s.

In 1919 at a shop in Barcelona, a Spanish physician, Isaac Carasso, commercialized pure cultured yogurt to prevent milk intolerance and

gastrointestinal distress. He obtained the antidote from Ukrainian microbiologist Ilya Ilyich Mechnikov, winner of the 1908 Nobel Prize in Medicine.

During World War II food rationing in Europe, British Minister of Food Frederick James Woolton forced dairiers to slaughter herds to free pastures for growing grain and vegetables. The abrupt shift in agriculture produced an immediate milk scarcity. The war also advanced concepts of naval readiness by adding milk products to the seagoing diet. After the war, the concept of bolstering bones and teeth with milk applied to schoolchildren in Australia, Ireland, New Zealand, and the United States. More recent concerns target modern-day additives to milk products, particularly antibiotics and growth hormones in cattle and guar gum in cottage cheese, both of which impact children's health.

Today, reefer ships speed dairy products directly to grocers in small coastal towns. Food processors manipulate raw milk by reducing fat and water content, condensing and homogenizing it to spread cream throughout, flavoring it with strawberries and chocolate, and enriching with vitamins for infant formula. Factory dairy manipulation involves evaporation of milk for Malaysian coffee, churning of white butter for couscous in Arabia, coagulating liquid into ricotta for Italian mascarpone, and fermenting into Yakult in Brazil.

The addition of yeast in India produces a fermented curd preferred by Hindu vegetarians. Indians also turn cream into *cham cham*, a block candy topped with coconut. The dairy-based fare of Kashmir calls for more piquant ghee and yogurt added to rice dishes. Tibetans drink butter tea with churned yak's milk; Czechs and Latvians use *quark* (unaged cheese) as a sandwich filler and basis for cheesecake. In the Punjab, celebrants drink sugared or herbed buttermilk from street vendors. Russians bake and caramelize milk for use in desserts.

See also: Animal Husbandry; Cheese; Guar; Hormones in Food; Marshall, Agnes; Polo, Marco; Scandinavian Diet and Cuisine; Trading Vessels; Yogurt.

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Dal

A husked chickpea, kidney or mung bean, red or yellow lentil, pigeon pea, or vetch, dal (also daal, dahl, or dhal) is any of 50 varieties of split pulse that add fiber and protein to a vegetarian diet. In India, dal occupies the place that cheese and meat fill in other cuisines. Connoisseurs rank the variant dishes from gourmet class to crude peasant porridge and food fit only for livestock.

To increase palatability, cooks since early times have decorticated lentils by soaking and loosening skins between wet towels, either by hand or with a rolling pin. The preparation readies yellow split peas for a popular dish among Southern Asians and the Indian settlers of Canada, Guyana, Trinidad, and the United States. The addition of lime juice, turmeric, and a garnish precedes serving with brown or white basmati rice, a fragrant long grain grown in the Punjab.

A dietary staple from Nepal south to Sri Lanka from 3000 B.C.E., dal grew in plots cultivated by Aryans in the Indus Valley of northern Pakistan and the Punjab in northwestern India. The Punjab developed more dal recipes than any other Indian state. Practitioners of Ayurvedic medicine prescribed monodiets on dal as a body purifier and stabilizer after childbirth or surgery and as an aid to memory. Dal anchored a popular stew in Bangladesh and Pakistan, complementing roti (toasted flatbread) and rice pilau.

Consumers bought ingredients in bazaars or ready-to-eat dal or *khichri* (dal with wheat) in cook houses. The poor resorted to grinding dal with barley, India's cheapest food crop, for baking into chapatis. In Sind, Pakistan, the destitute ate kesari dal (*Lathyrus sativus*), a toxic grain that caused chronic joint pain, hives, and eventual leg paralysis. Diagnosticians claimed that kesari dal produced white

spots that degenerated into leprosy. Famines in Afghanistan, Eritrea, Ethiopia, and India caused extended reliance on kesari dal and greater evidence of emaciation of the gluteus and leg muscles.

A digestible food after removal of the seed aril, dal cooks slowly over charcoal heat. It absorbs the flavors of fresh tomatoes or of asafetida, bamboo shoots, coconut, coriander, cumin, fenugreek, garam masala, jaggery (unrefined palm sugar), mustard, red chilies, or turmeric sautéed in ghee (clarified butter). Another use involves serving dal as a fluffy grained side dish or grinding it into flour for thickening sauces and stirring into pancake batter.

Dal recipes appeared in Sanskrit compendia as native comfort foods made from the world's earliest domesticated plants. In 6 C.E., Tamil holiday literature referred to the service of mung dal with sugar and milk for a mid-January festival and named *idli*, a spongy dal breakfast food or snack.

Indians fermented black gram (lentils) into the savory idli cake and served it with condiments. Around 900, Jain writer Shivakotiacharya, author of the devotional poem *Vaddaradhane (Worship of the Venerable)*, described the fermentation process. Subsequent recipes characterize chutney, curds, and ghee as common accompaniments to idli. A more detailed recipe appeared in the seventh chapter of the *Lokopakara (For the People's Benefit, ca. 1025)*, a Sanskrit encyclopedia, detailing the use of buttermilk to soak urad dal (black beans) and listing dosages of mung dal for arthritis.

Indian cuisine particularizes dal dishes by region, such as vetch in Patna and *mag dal* (yellow lentils) in Gujarat, where parents feed the soft legumes and rice to weanlings. In Rajasthani cuisine from northwestern India, *pachrangi dal* features five types of dried legumes in proportion—1 part *channa* (sweet yellow split peas), 2 parts *mung* (green beans), 3 parts *masoor* (red lentils), 4 parts *toor* (yellow pigeon peas), and 1 part *urad* (black beans)—soaked overnight and cooked Mogul or Persian style in hot ghee. A dal cracker called *papadum*

[Recipe: Sweet Potato Dal](#)

Soak 1 cup *channa dal* (a sweet yellow split pea) in water for two hours and drain. Brown one chopped onion in 1 teaspoon of crushed cumin and 3

tablespoons of vegetable oil. Add three chopped chilies, two diced tomatoes, 1/2 teaspoon of turmeric, and 1 teaspoon each of chopped garlic, coriander powder, and crushed ginger. Simmer the mixture until the tomatoes soften. Add the dal, 4 cups of water, and 2 cups of diced sweet potatoes. Cook covered on low heat until creamy. Serve with basmati rice and garnish with chopped cilantro.

nies meals and snacks either plain or topped with chopped onion. Other regional cooks produce West Indian dal curry and fermented dal, *rasam* (mung bean soup) cooked in tamarind or tomato juice, and sambar, or pigeon peas spiced with asafetida and tamarind in South India. Eastern Indian dishes pair dal with pickles and rice.

From the 1500s, the Portuguese influence turned the bland puree fiery hot with the addition of chilies and sweet from blends with sweet potatoes. Cooks prepare the dish ahead of time, but the seasonings require sautéing immediately before serving. In Britain and the United States, cooks season dal with butter and cream. A popular fast food, *dosas* consist of ground dal and rice fermented in a dough and cooked into crepes.

See also: Curry; Dried Food; Heritage Foods; Indian Diet and Cuisine; Lunch; Mustard.

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Danish East India Company

From 1616 to 1772, the Danish East India Company (Dansk Østindisk Kompagni or OK) joined the world marketing frenzy to dominate a lucrative trade in cloves, nutmeg, pepper, and tea.

Founded in 1615 by Herman Rosenkrantz and Jan de Willum, immigrants to Denmark from the Netherlands, the company received a charter from King Christian IV of Denmark and Norway on May 17, 1616, to import tea from China, India, Ceylon, and Japan. In a period of decline in Scandinavian prominence in world affairs, the king oversaw the establishment of the Danish stock market. He intended economic ventures to boost Danish influence in both food imports and the spread of Lutheranism.

From 1620, the OK headquartered in southeastern India at the Tamil town of Tranquebar, which the Danes bought from the rajah of Tanjore for an annual tribute of 4,000 rupees. Under colonial governor Ove Gjedde, traders modeled their administration on that of Dutch mercantilism and built OK revenue from shipments of Malabar pepper.

Lacking economic clout, the Danes struggled to compete against the larger ships and crew of the dominant food exporter, the British East India Company. Each year, the OK equipped two outward-bound merchantmen and two returning vessels. The Danish ship *København* imported Malayan pepper from Siam (present-day Thailand) to Tranquebar (present-day Tharangambadi) for global distribution. In 1624, shipper Roland Crappé plotted a route to Makassar on Celebes Island (Sulawesi) to add Indonesian cloves to the company's inventory. He opened ware houses at Balasore (Baleswar), Masulipatnam (Machilipatnam), and Pipeley in India and installations in Japan, Java, and Sumatra.

In addition to trade in cloves, which the Danes monopolized, the OK bought cotton, porcelain, sandalwood, silks, sugar, tea, and turtle shell. The firm profited from smuggling tea into Britain, where food dealers eagerly bought the Danish wares to avoid British import taxes. A year later, the OK leased its seagoing trade ships to carry Portuguese wares from Makassar over the Bay of Bengal. Financial mismanagement forced the Danes to accept Dutch help in 1628 in manning Fort Danesborg at Tranquebar.

The OK chose violence as its modus operandi in subduing its Indian colony

and bartered military naval support with its prospective clients in exchange for goods. Beginning in 1642, captains profited from naval attacks on some 30 Mughal ships from Bengal and from the looting of spice and tea shipments. The death of King Christian IV and the lackluster financial acumen of his successor, Frederick III, weakened Danish support for global trade until 1671, when King Christian V, Frederick's successor, offered the OK a new royal charter. In 1672, the company made greater inroads into the Asian food trade by expanding voyages to China, Japan, and Tonkin (Vietnam). To smooth the way with China, the Danish king corresponded with the Emperor Kangxi of China and dispatched the *Fortuna* from Copenhagen to Fuzhou in 1674 with Scandinavian and Indian goods.

While the Dutch and English engaged in religious wars, the Danes turned neutrality to their advantage. By 1675, the Danes rivaled both Dutch and English in trading from India. Danish merchants added Oddeway Torre, a pepper clearing house on the Malabar coast, in 1696 and, two years later, added Gondalpara, southeast of Chandernagore (Chandannagar). Beginning in 1699, the Danes extended operations to the Nicobar Islands and Frederiksnagore (present-day Serampore) in Bengal, named for King Frederick V. The Crown colonies became a haven for Lutheran missionaries, who proselytized the Indians.

Trade declined during Denmark's war with Sweden, an 11-year conflict that stripped the OK of its operating capital. At war's end in 1720, the situation was unsalvageable. During the governorship of Rasmus Hansen Attrup at Tranquebar, the company foundered in 1729. It reorganized in 1732 under Governor Diderich Mühlenport as the Asiatic Company (Asiatisk Kompagni), which monopolized the Indian tea trade until the company's bankruptcy in 1772. In 1845, the Danes sold Tranquebar to the British East India Company.

See also: Seaman's Diet and Cuisine.

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[Danish West India Company](#)

From 1671 to 1776, the Danish West India Company (Dansk Vestindisk Kompagni) maintained Caribbean colonies that reaped the profits of cotton and tobacco cultivation. Within decades, the Danes dominated sugar production in the Lesser Antilles.

From 1654, Danish commerce in West Africa built investment capital from trade in gold, ivory, palm oil, and sugar. In 1659, to profit from the Caribbean sugar and tobacco trade in St. Croix, St. John, and St. Thomas (now the U.S. Virgin Islands), Dutch traders Isaac Coymans and Nicolaes Pancras sold shares in a limited Danish charter firm called the Danish Africa Company (Dansk Afrikanske Kompagni). In competition with the Dutch, Danish colonists settled Africa's Gold Coast (present-day Ghana) and the Danish Virgin Islands. Pioneers organized a triangular trade in molasses, rum, and slaves and to a lesser degree in ginger and indigo.

In 1662, Admiral Erick Nielsen Smit (or Schmidt) superintended commerce from St. Thomas under the aegis of King Frederick III and turned the island harbor into a major entrepôt. The colony incorporated not only Danes, but also Dutch, English, Flemish, French, German, and Sephardic Jewish immigrants. The dominant languages were Dutch and English.

Food plants broadened the tastes of Europeans by adding cashews, coconuts, custard apples, mameys, mangoes, pawpaws, soursop, and tamarind to pantry staples of arrowroot, cassava, and sweet potatoes. Farmers planted beans, corn, okra, pepper, plantain, sorrel, and squash and harvested cacao to make chocolate. Local healers treated malaria and yellow fever with eucalyptus and yellow love

vine leaves and with healing regimens involving eggs and raw lizards. Fruits and vegetables joined imported cattle and swine and native conch, crab, herring, lobster, mackerel, oysters, sardines, shrimp snapper, tarpon, and turtles on plantation tables to create a fusion cuisine.

Epidemics and the death of Governor Smit sapped the infant colony of purpose and direction. British pirates drove the settlers from St. Thomas in 1667.

A New Start

Under the financial direction of King Christian V, the Danes once more invested in sugar plantations and global commerce in cotton, dyes, spices, and tobacco. In 1672, the king chartered the Danish West India Company under company governor Jørgen Iversen Dyppel, who imported indentured servants and convicts to found the port of Charlotte Amalie on the island. Of some 200 pioneers, only 29 remained in the St. Thomas colony by the time of its desertion in 1673. A renewed effort imported slaves from Guinea, veterans of farms in hot, wet climates.

By 1680, plantations powered by windmills flourished on St. Thomas under the direction of 156 whites and the labor of 175 black slaves. The northeast trade winds turned the mill sails, powering iron-plated rollers that extracted juice from sugarcane. In 1691, St. Thomas boasted 101 plantations. Its importers profited from the neutrality of Denmark during European wars. At the capital, Charlotte Amalie, wharves stacked with building materials, hogsheads of sugar, and puncheons of rum carried the stamps of global entrepreneurs. In the main street, marketers set up butcher stalls and displays of fish, bananas, herbs, melons, mangoes, and vegetables.

On March 23, 1718, Governor Erick Bredal attempted a similar settlement on St. John, where he imported five soldiers, 16 slaves, and 20 planters. Pioneering required forest clearing, terracing of hillsides, and the plowing and seeding of open land. Within a decade, a population of 123 Europeans and 677 slaves operated 87 plantations.

The 518-acre (210-hectare) Annaberg sugar factory, built in 1718, set the example of profitability for the island's 20 sugarworks, which averaged 80–90

acres (32– 36 hectares) in size. For 20 hours each day, slaves watered sugarcane plants by hand. They completed the sugaring process by cutting and bundling cane and, using a windmill, crushed the canes to extrude up to 500 gallons (1,900 liters) of juice per hour. After boiling down in copper kettles into crystals, the brown sugar filled wood barrels holding 1,600 pounds (725 kilograms) each. The remaining concentrate formed molasses, the basis of rum.

Despite a disruptive Akwamu (Ghanian) slave revolt at the Coral Bay fort, the St. John economy grew to 109 plantations by 1739.

The Third Island

In 1733, when the Danish West India Company negotiated with the French for St. Croix, Denmark's third foothold in the Caribbean, colonizers benefited from the mistakes made by the settlers of St. Thomas and St. John. From the company plantation at La Grange, Dutch-style stone windmills extruded cane juice. Managers recycled fiber waste, called bagasse, into fuel to heat copper boilers. The raw sugar advanced by ship to refineries in Denmark, where law required the purchase of materials from the Virgin Islands at a fixed price.

The clearing of St. Croix timberlands for more sugar plantations upped the demand for slaves. During transport over the Middle Passage from Guinea, ship captains increased survival rates by supplementing the typical slave diet of barley gruel, beans, millet, and salt pork with rum and tobacco. Humanitarians, concerned for the high death rate among both African abductees and European sailors, ended the slave trade in 1803, but did not abolish slavery on St. Croix.

[Recipe: Virgin Islands Pepper Pot](#)

Soak four eddo or tannia leaves and 1 pound of spinach in salted water. In fresh water, soak 8 ounces of chopped pumpkin, three small squash, and 1 pound each of chopped eggplant, okra, and green pawpaw with 2 pounds of chopped beef. Stir-fry meat and two chopped onions in vegetable oil for five minutes. Add vegetables, meat or seafood, and onion to 2 quarts of water. Cook until tender. Add 1/2 cup each of minced chive, parsley, and thyme.

Season with four whole cloves, one minced garlic clove, two hot peppers cut into pieces, a 1 inch–long cinnamon stick, and salt and pepper. Simmer until thickened. Instead of beef, this dish also can be made with conch or fish; alter the cooking times accordingly.

In addition to commercial agriculture, Arawak and Carib farmers wrested from the land two annual crops of cassava, corn, and vegetables. Slaves swelled their monthly provision allotments with loot from plantation pantries of beer, cod, flour, ham, rum, and wine. Daily meat and produce markets supplied islanders with chickens and pigeons, oranges, potatoes, and wild berries and plums. By candlelight, shoppers flocked late in the evenings to Christiansted's produce stalls to buy cabbage, eggs, pumpkins, tomatoes, and yams. To the European cuisine, slaves added black-eyed peas, cornmeal cakes, roasted sweet potatoes, and African versions of the Carib specialty, callaloo pepper pot—fresh greens flavored with red pepper, a high source of fiber.

Demand during the American Revolution raised St. Croix sugar exports to nearly 8,400 tons (7,600 metric tons). During the War of 1812, production burgeoned to 23,000 tons (20,900 metric tons). Island plantations also profited from pasturing herds and from the sale of beef, mutton, and pork. Competition from sugar beet growers in Europe and from sugarcane-growing in Brazil, Cuba, India, and Mauritius caused economic decline of the Danish Virgin Islands and forced planters out of business. Huge land blocks required division into farms for the cultivation of diverse crops by rural homesteaders. In 1917, the United States bought the three islands, known as the U.S. Virgin Islands, and promoted tourism.

See also: Manioc.

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[Darwin, Charles \(1809-1882\)](#)

Naturalist Charles Robert Darwin observed and tasted unusual foods on his voyage around the world, filling his writings with culinary details.

A native of Shrewsbury, Shropshire, he was born on February 12, 1809, to physician Robert Waring Darwin and Susannah Wedgwood Darwin, who died when he was eight years old. Reared in the Unitarian faith, he studied medicine at the University of Edinburgh and biology at Cambridge University. As president of the Glutton Club at Cambridge, he led members in samplings of bittern, hawk, and owl.

On an around-the-world study voyage beginning December 27, 1831, he traveled five years aboard the HMS *Beagle* to the Cape Verde Islands, Brazil, Argentina, Chile, and the Galápagos Islands west of Ecuador. After crossing the Pacific to Tahiti, where ferns anchored the island diet, he continued his survey of edible plants and animals in Australia and at St. Helena in the South Atlantic Ocean.

In *A Naturalist's Voyage Round the World* (1860), Darwin expounded on world diet, such as the provisioning of Brazilian cavalry with mare's meat. He gathered ostrich eggs, which provided 11 times the amount of sustenance as chicken eggs, and ate manioc bread, which natives made from pounded manioc root. Befitting a banquet guest, at a plantation in Socego, Brazil, on April 13, 1832, he ate of each dish—beans, beef, rice, venison— but regretted the appearance of roast pork and turkey, which threatened to overstuff him. Because of the low vegetable variety at Tierra del Fuego, off the southernmost tip of the South American mainland, he theorized that it was the only place in the world that considered fungus (*Cyttaria darwinii*) a kitchen staple. In contrast, Chile offered an abundance of beans, corn, and wheat as well as an appealing fruit menu of figs, grapes, and peaches.

On Darwin Island (initially called Culpepper Island and renamed in honor of Darwin) in the Galápagos Islands group west of Peru, the naturalist reported his

observations of species mutation and natural selection. At Asilo de Paz on Floreana Island, also in the Galápagos group, he encountered rare species of animals and plants, including a croton tree whose leaves made an aromatic tea. His journal recorded details of native thatched huts and Peruvian plantations growing bananas, corn, sugarcane, and sweet potatoes. He characterized the native “Robinson Crusoe” protein sources as feral goats and pigs, turtle eggs, and tortoises. A feast with an island governor included manioc bread, melons, plantain, pumpkin, and tea poured from tortoiseshell pitchers. He hunted for the *Beagle* crew’s food supply of deer, tuna, and turtles and also ate armadillos, a rare rhea, guinea pigs, land iguanas, and a 20-pound (9-kilogram) rodent that he declared the best meat he had ever eaten.

For convenience, Robert FitzRoy, the commander and surveyor of the *Beagle*, brought on board saddleback land tortoises, which survived for months without either food or water. FitzRoy’s crew loaded 30 “elephant tortoises” from Chatham Island (Rekohu), the largest island of the Chatham Islands group in the south Pacific Ocean off the eastern coast of New Zealand. Each tortoise required six men to transport, but the ungainly beast was worth the effort for its “excellent and extremely wholesome food.” Each tortoise supplied 8 gallons (30 liters) of oil for the Pacific crossing and some 200 pounds (90 kilograms) of meat. The beast was so convenient a catch for passing ships that by the 1830s, visitors to Charles, Hood, and James islands had nearly destroyed the species.

The world tour gave Darwin much material to ponder concerning human sustenance. Readings in Thomas Malthus’s *Essay on the Principle of Population* (1797) impressed Darwin with the concept that the global population would grow exponentially until it outpaced the food supply. In Darwin’s landmark book *On the Origin of Species* (1859), he predicted that, by the next millennium, competition for food would plunge human kind into turmoil and create a vicious struggle between species.

Darwin’s theories of struggle and survival within living organisms revolutionized science. Among the failsafes for the human table, he added to the list of foods that people considered edible. In *The Expression of the Emotions in Man and Animals* (1872), he observed the universal response to contemptible, disgusting, or socially unacceptable food through gagging, retching, spitting, and vomiting. In Tierra del Fuego, a native had disgusted the scientist by touching his

serving of cold preserved meat, which the Fuegian found too soft for palatability. He also discusses the converse reaction, salivation, which prepares a diner for tempting servings that appeal by sight, aroma, texture, or the memory of a previous satisfying experience.

See also: Manioc.

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[Daubenton, Louis Jean-Marie \(1716-1799\)](#)

French vegetable physiologist and comparative anatomist Louis Jean-Marie Daubenton, one of the four founders of French biology, applied the intellectualism of the Enlightenment to matters of food and digestion.

A native Burgundian from Montbard, Daubenton began his education under Jesuits. He studied medicine at Reims and dedicated himself to biological fieldwork, writings, and illustration. At the Jardin du Roi in Paris in 1742, he collaborated with encyclopedist Georges-Louis Leclerc de Buffon in compiling and illustrating the first 15 segments of the 36-volume *Histoire Naturelle, Générale et Particulière* (*Natural History, General and Specific*, 1749–1789). The quality of Daubenton's work earned him a royal cabinet appointment in Paris at age 29.

While chairing general zoology at the Collège de France, lecturing on rural economy, and directing the Museum of Natural History in Paris, Daubenton

influenced the farming, beekeeping, and herding preferences of his time. He corresponded with American polymath Benjamin Franklin and introduced Europeans to the cultivation of the date palm.

Daubenton's evaluation of the Spanish Merino sheep in *Instructions of Shepherds and the Proprietors of Flocks* (1784) spurred vast shifts in the mutton and wool market. His commentary on fattening four-year-old sheep for slaughter insisted on stall-feeding with clover and fescue plus bread, oats, hemp or rape seed, and hazelnuts. He recommended a vegetable diet for herds of cabbages, carrots, corn, potatoes, and turnips, a regimen that Louis XVI employed at his sheepcotes at Rambouillet.

In his studies of practical medicine, Daubenton noted the slowing of digestion in the middle-aged and elderly human and recommended vegetarianism to prevent dyspepsia and flatulence. With *Memoire sur les Indigestions (Treatise on Dyspepsia, 1785)*, he pioneered the use of ipecac in small amounts as a treatment for indigestion. Like the action of after-dinner cayenne pepper, ginger, and rhubarb, by stimulating peristalsis, the natural rhythmic contractions of the stomach, the dosage energized gastric glands to produce mucus. Taken in jelly, lozenge, water, or wine, the ipecac treatment expedited the movement of food through the stomach without causing nausea or pain.

Daubenton survived the Reign of Terror, the mass deaths of aristocrats and royal appointees during the French Revolution of 1789–1799, by maintaining his role as agronomist and herder. Before his death on December 31, 1799, from stroke, he directed the Luxembourg Gardens in Paris and introduced fruits from around the world as well as cultivation of the potato.

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David, Elizabeth (1913-1992)

In the mid-1900s, English culinary historian and kitchen master Elizabeth Gwynne David revived enthusiasm for home cooking of heritage foods and traditional recipes.

She was born into an upper-crust family in Sussex on December 26, 1913, and educated at High Wycombe and Tunbridge Wells, where she came to despise cheerless boarding school meals of limp fried fish and canned apricots served over custard. She trained in art and theater in Paris at the Sorbonne and savored her first taste of mussels. In 1931, she took lessons in German in Munich, where sage-flavored fried eel nauseated her. During World War II, on a voyage from England to Greece, she wrestled with galley cookery aboard the sloop *Evelyn Hope*. On the island of Syros, she shopped at an open-air market and cooked over a brazier outdoors at her cottage, where she embraced the simplicity of daily meals from fresh supplies.

Fleeing German invaders, Gwynne settled in Alexandria, Egypt, where she enjoyed the cosmopolitan influence of Arabs, Armenians, Copts, Syrians, and Turks. She took posts in Cairo as a cryptographer for the British navy and librarian for the Ministry of Information. Under the tutelage of her cooks, Kyriacou and Suleiman, she learned to enjoy herbed vegetables, octopus in thyme branches, quail kebabs, and charcoal-grilled pigeon, a Nile-side specialty. During bohemian experiences cooking on Primus stoves and a tin box oven, she displayed touches of identity and uniqueness.

Revitalizing English Cuisine

Upon her return to England at war's end, the author combated high food prices and frumpy kitchens with their stores of dehydrated egg packets and tasteless powdered soup. She chose as a weapon elegant articles about the regional Mediterranean diet for *Harper's Bazaar*, *Nova*, *Vogue*, and the *Sunday Times*. Still rationed, English supplies of butter, olives, tea, and tomatoes remained scarce and Parmigiano-Reggiano cheese and eggplant unknown. For a decade, readers learned details of the imaginative French and Italian use of basil and marjoram,

langoustine and octopus, mountain herbs, Parma ham, peppers, saffron, and salami. She aimed to retrieve French table style from “a snob’s preserve” to cookery within the grasp of the English middle class. At her urging, grocers tempted English shoppers with courgettes, croissants, fava beans, olive oil, pimientos, sheep’s milk cheese, and zucchini.

At the age of 47, David and husband, Tony David, settled in Chelsea. To recreate the ambience of Syros, she decorated the kitchen in the Mediterranean style, with terra-cotta pots and baskets of eggs and lemons and without the “clanking ironmongery” of overdone English kitchens. In 1950, she issued an illustrated manual titled *A Book of Mediterranean Food*, a compendium of sensual pleasures laced with food commentary by authors Lawrence Durrell, Henry James, D.H. Lawrence, and Gertrude Stein.

Flavors of France, Italy, and Beyond

David followed with *French Country Cooking* (1951), in which she identified the flavors and textures of Alsace, Brittany, Burgundy, Île de France, Normandy, Provence, and Savoy. The text introduced English cooks to the mandoline, mezzaluna, and moulinette, all essential European equipment for slicing, chopping, and pureeing. After a tour of Venice, she summarized the style and flair of regional cookery in *Italian Food* (1954). The text admired the verve of Neapolitan and Sicilian caponata and ice cream eaters and listed essential ingredients— capers, chickpeas, Gaeta olives, garlic, pasta, pine nuts, porcini mushrooms, prosciutto, tuna—that the English pantry lacked.

David’s global interests came together in *Summer Cooking* (1955), a collection of dishes from England, the Mediterranean, India, Mauritius, and Russia to grace “la bonne table.” She mocked the pretensions of Michelin Guides and their awarding of stars to self-important restaurants. A more thorough study of fundamentals, *French Provincial Cooking* (1960) deconstructed the elements in classic dishes, particularly *pot-au-feu* (beef stew) and everyday pâtés and terrines. She carried specificity to great lengths, even describing a favorite charcuterie in Ardèche.

Recovering from a cerebral hemorrhage at the National Hospital for Nervous

Diseases in London, David suffered a loss of vigor and agility as well as part of her speech and some of her sense of taste. In November 1963, she set up in the kitchen trade in Pimlico and sold cookbooks, imported Tuscan oil, and imported equipment to dedicated cooks. Her love of vivid color inspired Le Creuset to distribute cast-iron cookware enameled in blue. Her standards for cuisine demanded authentic photos of ingredients and a minimum of out-of-season imports and “food in fancy dress.”

Tutoring the English Homemaker

After two decades of focusing on Mediterranean cuisine, David shifted her emphasis to British fare. Her articles scolded the English for investing in bouillon cubes, gravy mix, ketchup, and other commercial flavorings and for limiting herbs to rosemary and sage. In place of too many processed flavorings, she proposed reliance on good wines. She researched recipes for smoked fish, stewed steak, Indian curry, mince pie, and fruit pickles for *Spices, Salt and Aromatics in the English Kitchen* (1970) and recommended Tuscan salt, the key ingredient of Gorgona anchovies. After closing her kitchen shop, she wrote an award-winning cuisine retrospective, *English Bread and Yeast Cookery* (1977), from a hospital bed following a car accident. Her zeal for wholemeal (whole wheat) loaves generated an English rebellion against mass-produced baked goods.

David’s autocratic critiques of table arts earned her membership in the Royal Society of Literature and a Commander of the Most Excellent Order of the British Empire. In declining health, David compiled an omnibus edition of her essays, *An Omelette and a Glass of Wine* (1984), which lauded French markets, whiskey in the kitchen, and the eateries of Iberia and Morocco. Her papers and

[Recipe: Ratatouille](#)

2 onions	4 ripe tomatoes
olive oil	2 cloves garlic
2 eggplants	a dozen coriander seeds
2 large red bell peppers	parslev or basil

Chop the onions fairly small and put them to stew in a sauté pan or deep frying pan in half a tumbler of olive oil. Meanwhile, cut the eggplants, leaving on their skins, into 1/2-inch squares and put them, sprinkled with coarse salt, into a colander so that some of the water drains away from them. When the onions have cooked about ten minutes and are beginning to get soft (but not fried), add the eggplants and then the peppers, also cut into small pieces. Cover the pan and let them simmer for 30 to 40 minutes. Now, add the chopped tomatoes, the garlic, and the coriander seeds. Continue cooking until the tomatoes have melted. Should the oil dry up, add a little more, remembering that the liquid from the tomatoes will also make the ratatouille more liquid, and the final result must not be too mushy. When cold, garnish with chopped parsley or basil. Drain off any excess oil before serving.

collected cookbooks survive at Harvard's Schlesinger Library, the Warburg Institute in London, and the London Guildhall Library. In 2006, the British Broadcasting Corporation (BBC) recapped her accomplishments in a film, *Elizabeth David: A Life in Recipes*.

See also: Grilling; Ice Cream; Nouvelle Cuisine.

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De Soto, Hernando (ca. 1496-1542)

Spanish explorer Hernando de Soto paid a heavy price for mounting a four-year expedition to the Americas without adequate provisions. A native of southwestern Spain reared in a middle-class house hold, he led the first European expedition (1539–1542) to the Mississippi River.

At age 18, De Soto sailed to Mesoamerica with fantasies of subduing tribes and conquering territory for Spain. From Nicaragua, he pressed along Yucatán in search of a sea route to Asia and looted Cajamarca, Peru, the capital of Inca Emperor Atahualpa. Under the leadership of Francisco Pizarro, De Soto joined the rifling of Cuzco, Peru, to add gold and silver to that stolen from Atahualpa. By the time De Soto departed Peru in 1536, his wealth rivaled most of the world's richest individuals.

On a second expedition to the Caribbean in May 1539, De Soto assumed the governorship of Cuba, a post granted by Holy Roman Emperor Charles V. De Soto's entourage brought to Cuba weapons and ammunition as well as horses and mules, plows, and seeds for establishing gardens at potential colonies.

On May 18, 1539, De Soto, leading a fleet of eight ships and 620 men, set out from Havana to North America on the flagship *San Christoval* to claim land for the king. He took with him Vasco Porcallo de Figuerora, a rich Cuban who organized equipment, horses and pigs, and 3,000 loads of cassava bread, bacon, and corn, a storable, transportable form of nutrition. Other goods filled barrels, casks, and pottery containers. For the next four years, corn served the Spaniards as survival food. Before De Soto's disembarkation at west-central Florida, his vanguard collected berries and forage for their horses. North of the landing, De Soto found good hunting—birds, deer, and turkeys—enough to feed the expedition for six weeks.

De Soto herded domestic swine as famine food and possible trade items as well as for the main courses of feasts. He released into the wild long-nosed, tusked pigs from Extremadura, Spain, the ancestors of the American razorback. Because feral pigs were omnivores that stored 35 percent of the food energy from the offal, acorns, chestnuts, mushrooms, lizards, moles, snakes, and worms that they ate, they promised a source of fat and meat for future Spanish colonization.

At Ocale (present-day Ocala, Florida) De Soto and his men traded glass beads

and iron tools with village chiefs for beans, corn, and dog meat. Food availability was so limited that the Spaniards raided the nearby home of the Acuera people on the Ocklawaha River for more corn. Theft and abduction set a pattern for the Spanish advance. De Soto also countenanced kidnapping of Indian women to perform the labor-intensive job of pounding dried corn into grits, baking corn cakes, and cooking beans and squash and of youths as porters for supplies and utensils.

Feeding the Troops

Beginning in August 1539, a meandering four-year march routed the expedition from Port Charlotte, Florida, east into Indian societies less urbanized than the Aztec or Inca, who warehoused food for large cities. The absence of provisions forced De Soto to dispatch Captain Baltasar de Gallegos and 180 men in foraging teams to find birds, fish, small game, and herbs and roots. At present-day Tampa to Urriparacoxi (Sumter County) and north to Napituca (Live Oak, Florida), in mid-September, the Spanish harvested a three-months' supply of green corn from lush fields. Their journals report grapes, muscadines, mulberries, and plums, chestnuts, hazelnuts, and walnuts, and butter made from acorns. Obscure descriptions of fruits similar in flavor to pears and strawberries leave in question the exact species.

Rumors of corrals of deer and turkeys in Uqueten (Dade City), Ocale Province, north of Tampa Bay, lured the Spanish onward. Over a swampy trail, hunger compelled them to stew wild greens and herbs. Risking sickness and possible poisoning, the men roasted and gobbled unknown roots. Soldiers stacked firewood, crushed corn in mortars and pestles, and sifted meal for bread through their chain mail. They spread cornmeal dough on earthenware griddles above coals in the fire. Men in a hurry parched corn directly on metal armor and stewed it whole. At the Withlacoochee River, they ate the fibrous cores of cabbage palmetto known as hearts of palm.

In Indian villages, De Soto remarked on the ready stores of honey and the melted fat of bear and oil from black walnuts, which they poured into gourds for use in cooking and healing. In July 1539, he encountered a vast phosphate ridge

that supplied enough pasturage and grain fields to sustain the conquistadors; however, the constant fording of black-water rivers depleted men weary of foraging and hungry for salt meat. Building bridges and wading through swamps left no time for fishing, gathering shellfish, or shooting the ample herons, ibis, storks, or wild turkeys.

At the Santa Fe River in north-central Florida, the Spaniards found the Alachua living on raised platforms and caching provisions in pits. In addition to collecting hickory nuts and palm berries, the Alachua used clay pots to cook blue gill, bream, catfish, muskrat, opossum, rabbit, raccoon, and squirrel. On August 15, 1539, at Cholupaha (near Citrus Spring), soldiers gathered water

[Recipe: Pickled Hearts of Palm](#)

Remove hearts from emergent palm fronds of scrub palmetto. Lop off the tops and bottoms to expose the tender inner tissue. Soak in a brine of 3 cups of water, 1 cup of white vinegar, 1 teaspoon of alum, and 1/4 cup of sea salt. Cover and soak for a week before draining. Store hearts of palm in glass refrigerator containers and keep moistened with diluted vinegar. Eat raw in salads or add to trays of olives and cucumber pickles.

chinquapins, a dwarf chestnut that provided edible seeds and tubers. Northwest through Apalachee territory on the Florida panhandle, vegetable gardening spread so far across the land that the Spanish spent five months in comfort and plenty.

De Soto passed through Apalachen (Tallahassee), where Indians harvested tasty snacks of black cherries and wild yellow plums. Native gardeners grew beans, corn, gourds, and squash. The troops carried only enough provisions for 12 days of marching, primarily roasted corn kernels. Each trooper bore his personal share in his backpack. They varied their vegetable diet with birds and fish. The Spanish discovery of fragrant sassafras root offered a possibility of trade in a New World commodity valuable as a spice and as a drug to treat venereal disease.

The herd had grown to some 300 pigs, contributing protein to the Spanish diet.

Foraging parties packed biscuits and cheese from the dwindling travel larder. In Georgia, the forces encountered the Muscogee (Creek) Indians near the Ocmulgee River at present-day Macon, where the fall line between the piedmont and coastal plain supported a diet of fish and forage plants. The ravenous Spaniards devoured green corn, cob and all. If tribes hesitated to supply rations, the Spaniards threatened to release Bruto, the chief war dog of their meathungry bloodhounds, which were trained for manhunts.

At Cofitachequi (Camden, South Carolina), on May 1, 1540, near-starvation forced the remaining 550 men of the De Soto campaign from one tribe to the next. When news of the approaching force passed up the Indian grapevine, one tribe donated 700 turkeys to the troops. In July, after covering 1,300 miles (2,100 kilometers), the expedition reached present-day Knoxville, Tennessee. Ground corn supplied both the Spaniards and their 230 mounts for the journey into the Carolinas, southwest along the Tennessee River to Alabama, and north to the alluvial plains of Mississippi and back to the Appalachian Mountains of Tennessee. At Quizquiz (Clarksdale) on the Mississippi, Indians rewarded the newcomers with edible bricks made from compressed red plums. On the way through Mississippi, the conquistador succeeded in supplying his expedition by holding native chiefs hostage.

Violent Foraging

De Soto's brutal methods of extorting provisions for hundreds of men and animals antagonized Native Americans. Simultaneously, the interlopers unintentionally disrupted villages by spreading chicken pox, influenza, measles, and smallpox throughout the Southeast.

Along the Gulf of Mexico on October 18, 1540, the theft of food and women from the Choctaw provoked combat at Mabila (Mobile, Alabama). After a nine-hour pitched battle, some 2,500 Indians succumbed to cavalry forays, superior armor and weaponry, and the burning of the palisades. Arson killed Chief Tascalusa and obliterated the Atahachi nation and culture. While only 22 of De Soto's forces died in the conflict, he lost so much equipment and harness that his men ate seven dead horses to spare any waste.

During winter on the Tombigbee River, the Spaniards ate well on corn, pecans, and rabbits. The crossing of the Mississippi River in June 1541 required the building of rafts to carry 400 Spaniards to dry land. After the expedition advanced northwest to Hot Springs, Arkansas, in March 1542, the troops located a wealth of beans, corn, and dried plums at the confluence of the Arkansas River with the Mississippi. De Soto, emotionally devastated and thwarted in his hopes of riches, contracted fever and died on the Arkansas side of the Mississippi on May 21, 1542, possibly near Ferriday, Louisiana.

Europe's longest foray into native America, De Soto's expedition exhibited to future conquistadors the value of dried fruit, ground corn, and nuts in sustaining an oversized phalanx of men on the move. Even a one-day delay meant skimpy rations and possible death of men and mounts.

New dining experiences awaited Castillians unaccustomed to barbecued hens, the corn-based Timucuan diet grown along the St. Johns River, or the buffalo eaten by well-fed Arkansas plains tribes. The Spaniards consumed so many indigenous barkless dogs that the breed neared extinction. Among the Mococo and Uzita hunter-gatherers of south-central Florida, the Spanish recorded a unique food culture based on fishing and hunting and the foraging for goosefoot, marsh elder, and smartweed, shellfish, and wild birds and animals. At Toa (Dawson, Georgia), the Europeans admired plastered and stilted summer huts featuring kitchen facilities for storing corn and sunflower seeds and baking bread. In the Ouachita Valley in south-central Arkansas, patient Indians taught De Soto's men how to snare rabbits, a method of provisioning making each man responsible for his own nourishment.

Under the leadership of Peruvian commander Luís de Moscoso, the scarcity of food forced the expedition's 311 survivors to build four flat-bottomed boats, pile them down the Mississippi River delta, and end the march at the Panuco River below Tampico, Mexico. Although De Soto found no precious metals, he provided Spain with information on aboriginal cultures that had survived in the Southeast for 14,000 years.

See also: Barbecue; Manioc; Pork; Salt.

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[Delessert, Benjamin \(1773-1847\)](#)

In a food war between the Old World and the New, industrialist, philanthropist, and herb collector Jules Paul Benjamin Delessert introduced beet-sugar refining to the Napoleonic Empire.

The son of a Swiss financier, Delessert, a native of Lyon, France, and his sister and brother received home training in botany through lectures and live specimens mailed from philosopher Jean-Jacques Rousseau. While studying science at the University of Edinburgh, Delessert traveled to Birmingham, England, to view James Watt's steam engine, the beginning of the Frenchman's interest in the factory system.

At age 20 during the French Revolution, Captain Delessert led an artillery company for the French National Guard in combat in Belgium and Holland. After accepting the presidency of the Savings Bank of Paris, he mechanized a model cotton factory at Passy, the first in France. He collected 250,000 specimens of 86,000 plant species at the Musée Botanique in Geneva that benefited world agriculture.

In 1802, Delessert opened a sugar-refining business. He stripped yellow beet juice of its color through purification, a success that earned him the title of baron of the empire. He applied his wealth to establishing 30 soup kitchens in Paris, a forerunner of the Société Philantropique.

A decade later, during serious food shortages in France, he pioneered a new food art: he bypassed the typical ingredients of chestnut, grape, honey, potato, and wheat to manufacture sugar loaves from beets, the vegetable with the highest

sugar content. To improve the aroma and flavor during the extraction of crystalline sweetener, Delessert filtered the juice through charcoal, a clarifying agent. His process improved the technology created in 1747 by Prussian chemist Andreas Sigismund Marggraf, who had boiled beets in alcohol before crystallizing the juice. The French method produced grains as fine as those from West Indian cane sucrose. For expert staff, he employed Spanish prisoners of war who had operated cane mills in the Caribbean. Delessert presented his first granular product at the royal palace and shared the technology with his rivals, who distributed sugar at medicine shops for the making of sugar syrups and sugar water, viewed as a healthful drink and tonic.

With money from the Emperor Napoleon I, Delessert filled a gap in military provisioning after the British blockade halted imports of West Indian cane sugar and raised the price to \$1.20 per pound. On August 22, 1810, the emperor was so desperate for supplies that he invested \$40,000 in 12 test laboratories to promote the crystallization of sugar from grapes to undermine England's world sucrose monopoly. In the next year, on March 25, Napoleon turned his attention to beets and ordered the Société d'Encouragement pour l'Industrie Nationale to fund beet planting on 80,000 acres (32,400 hectares). Education began at six agrarian schools, where 100 students earned scholarships to train for managing the beet sugar industry. A valuable by-product, beet solids suited the meat industry as cattle feed.

Delessert, the French sugar king, opened the first sucrose mill near Brussels at an abandoned abbey to crystallize pearl sugar. Made from beets, this coarse grain sweetener had the advantage of a high resistance to dissolution.

On January 2, 1812, Napoleon arrived at Passy to award Delessert the Cross of the Legion of Honor for his efforts on behalf of French trade. The emperor ordered the industrialist immediately to build a network of ten sugar refineries in temperate climates that could sustain beet fields. Despite complaints from the fastidious that beet sugar was inferior to imported goods, chemists attested that the grains of beet sucrose exhibited the same color, flavor, and weight as cane sugar. The mills produced tons of sugar annually and experimented with useful improvements and methods. Cooks turned sugar into a pantry staple for gelling sorbet, blending wine cordial restoratives and liqueurs, candying fruit, sweetening café au lait, and making delicate pastries, custards, and jam.

By 1813, French efforts, superintended by Delessert, had manufactured more than 2,200 tons (2,000 metric tons) of beet sugar. The next year, his concept spread to 40 sugar refineries across Europe—to Austria, Belgium France, and Germany. By 1838, there were 581 factories refining beets into sugar in France alone and an emerging sugar beet industry in the United States. Shifts in tariffs and treaties and the abolition of slavery in the Indies transformed the industry. In the 1890s, beet sugar supplanted cane sugar in the sweetener market and lowered the price of sweeteners for home use. From the inventor's name, restaurateurs added a "Dessert" course to menus.

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Desalination

Processes removing salt from water make available more potable water for home use and crop irrigation. The quest for purification methods in North Africa dates to Egyptian water sedimentation and decanting, which servants operated as early as 1450 B.C.E. Along the Fertile Crescent of western Asia after 850 B.C.E., the Persians devised primitive filtration systems by pouring heated water through gravel or sand, over porous stone, or into the seed pods of the *Strychnos potatorum*, a nut tree recommended for healing in Ayurvedic medicine.

According to the Sanskrit medical writings in the *Sushruta Samhita* (*Sushruta's Precepts*, ca. 600 B.C.E.), potable water resulted from boiling, solar heating, or plunging heated iron rods into brackish water. Around 360 B.C.E., Hippocrates, the Greek father of medicine, proposed straining boiled water through a cloth bag. Subsequent Roman methods replaced the filtration sack with clay filters, wick siphons, crushed laurel stems, coral, barley, sand, and fibrous cord.

Drinking water at sea and on arid shores prompted research into desalination. The United States began ridding water of salt on ships in 1791 at the instigation of Thomas Jefferson, then secretary of state under President George Washington. During World War II, mobile units desalinated water on large naval vessels traveling to North Africa and the Pacific. By the mid-1900s, desalination had become a global issue. The formation of Israel in 1948 raised questions of sustainability, which the nation's first prime minister, David Ben Gurion, interpreted as a need for desalinated seawater for municipal and farm and orchard use.

Under the U.S. Saline Water Conversion Act of 1952, hydrologists and engineers experimented with methods of cutting costs of desalination plants. The first demonstration facility, built in 1961 at Freeport, Texas, used vertical tube distillation to convert 1 million gallons (3.8 million liters) per day. For military purposes, hydrological techniques of ridding seawater of minerals enabled ships and submarines to remain at sea without calling at ports to fill their tanks. By the 1980s, desalination had become a commercial enterprise. In 2007, a U.S. facility at Tampa Bay, Florida, began providing 171 million gallons (647 million liters) of water per day for use over a 2,000-square-mile (5,200-square-kilometer) area.

The demand for such facilities grows annually as the world's population requires more fresh water for agrarian, domestic, and industrial use. The cost of building new water plants falls heavily on needy areas in China, the Colorado River basin, Gaza, the Jordan River basin, Spain, Tobago, and Trinidad. A thrifty method of desalting water, cogeneration involves directing excess heat from nuclear power plants to distillation mechanisms, a common cost reducer in Australia, India, Japan, Russia, and Saudi Arabia.

To ensure equity in global water use, the United Nations General Assembly in July 2010 declared water justice a human right. Proposals for alleviating human suffering from catastrophes and droughts and resultant epidemics and famine include building desalination plants. Currently, the United Arab Emirates operates the world's largest electrodialysis processing plant, at Jebel Ali southwest of Dubai. By changing water to steam, the mechanism rapidly distills potable water. The flash distillation technique produces 64 percent of the world's desalinated water.



The Hadera seawater reverse-osmosis (SWRO) desalination plant, on the Mediterranean coast of Israel, is the largest of its kind in the world. Desalination in Israel, one of the most arid countries on the planet, accounts for a majority of the nation's drinking water. (*Ariel Schalit/Associated Press*)

Osmosis competes with distillation by yielding more water at a lower cost. In Hadera, Israel, the world's largest reverse osmosis facility cost \$500 million, an outlay that supplies 16 percent of Israelis, or more than 1.2 million people. Brackish water passes through a waterpermeable ceramic or polymer membrane at high pressure to separate minerals. The proficiency of the reverse osmosis process keeps costs at 50¢ per cubic meter (38¢ per cubic yard).

Use of desalination systems protects the environment by limiting the overdraining of groundwater, lakes, and streams. Negative elements—air pollution, fossil fuel use, green house gas emission, mortality of fish and plankton—raise questions of how and where to establish intakes and methods of debrining outflow into calm waters, including the Persian Gulf, Red Sea, and tropical lagoons. One possibility is through solar desalination of open ponds and the reclamation of salt for sale.

See also: Irrigation; Salt; Water.

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[Díaz, Bernal \(1492-1585\)](#)

A chronicler of Hernán de Cortés's conquest of Mexico, Bernal Díaz del Castillo, an ordinary infantryman in 119 battles, preserved details of Mexica (or Aztec) culture and religion in a stirring New World history.

Reared in genteel poverty in Medina del Campo, Spain, Díaz went to sea in his mid-teens but abandoned hopes of wealth from his adventures in Tierra Firme (Panama). Disappointment in Cuba and Yucatán ended his illusions of New World promise. A subsequent role in the Spanish invasion of Aztec Mexico on February 10, 1519, placed him under the command of Cortés, the commander of a fleet of 11 ships. For the voyage, the *nao* (or carrack, a three-or four-masted sailing ship) stocked the standard seaman's diet—anchovies and sardines, bacon, biscuits, cassava flour, cheese, chickpeas, onions, salt pork, and wine. Additional stores fed war steeds, which the Spanish introduced to battle for the first time in Mesoamerica in April 1519 at Potochan (present-day Tabasco).

Upon disembarkation in Mexico, Díaz adapted to the Mesoamerican diet. His daily ration consisted of *aji* (peppers), cactus fruit, cassava, chayote, corn smut and tortillas, jicama, mushrooms, and the leaves of amaranth and goosefoot. Both Aztec and Spaniard found cause to complain of the dietary changes they encountered as the two cultures clashed: the Aztec at the tastelessness of wheat biscuit and the revolting texture of pork fat, the Spanish insurgents at the consumption of small dogs and *animalitos* (reptiles and vermin). Díaz also

quailed at the flaying of sacrificed humans, whose remains priests served at festivals with a pepper and tomato sauce.

On August 31, 1519, the Spanish cortege accepted gifts of 20 baskets of tortillas and 300 turkeys from King Xicotenga in south-central Mexico at Tlaxcala. The 40,000 native Otomi deliberately overfed their enemy before attacking them. That night, after Cortés's men overwhelmed the Otomi, military physicians dressed the Spaniards' wounds with fat rendered from the corpses of Indians.

When the Spanish advanced northwest toward Mexico City on November 1, they took new allies, 6,000 Otomi warriors. The Texcoco, another nation resentful of the Aztec, provisioned the grand army. The Emperor Montezuma II capitulated to the Europeans but begged them not to return to collect the annual tribute. He cited a pragmatic reason: The Aztec lacked the provisions for feeding so large an annual influx of Spanish.

The Aztec Way

Upon their arrival at Tenochtitlán (Mexico City) on November 8, 1519, the big-city life of Mexican Indians amazed Díaz. Opposite the great pyramid of the war god Huitzilopochtli, the Spaniards encountered an urban center housing 200,000–300,000 Aztec. Díaz commented on the need for controlled water distribution and on the orderly conveyance of food from outlying farms. At the arcaded central plaza, he gawked at the variety of vegetables and fruits, organ meats, and ready-to-eat stews and tamales offered to some 25,000 shoppers. Farmers delivered fresh goods by canoe from *chinampas* (floating gardens) on Lake Xochimilco. The huge market featured separate sections for specific foods, utensils, and slaves. In addition to tobacco, vendors stocked indigenous medicinal herbs, sweet-smelling salves, and seeds, but nothing from the outside world, not even cotton or salt. Royal inspectors collected taxes, settled commercial disputes, and examined the quality of salt, fish, flint kitchen knives, and loaves of bread baked from dried alga gathered from the lake, a spongy product the author compared to cheese. In response to Cortés's insulting remarks about pagan idols, Montezuma retorted that Aztec gods were responsible for providing food and water and for nourishing the cornfields, the source of *atole*, a corn beverage, and tortillas, the Indian staff

of life.

Díaz observed the extravagant habits of daily feasting at the emperor's palace, which required some 400 waitstaff bearing fragrant poultry, corn specialties, and hen and egg entrées along with side dishes of salad and vegetables in broth. Another 1,000 portions served the royal security guard. Pages spread the table with silvered and gilded fowl and the heads of calves, deer, and swine and kept each platter warm over fires kindled in clay braziers. Proper presentation demanded the adornment of tamales with beans and seeds and the shaping of corn cakes into animals and butterflies, a symbol of deceased warriors' spirits winging back to Earth. Meal service continued throughout the day for Montezuma, who sat behind a screen on a cushioned stool. He ate in silence and shared tidbits with four distinguished elders. Servants disposed of hand-washing implements for before-and after-meal cleansing and tossed out the emperor's dishes, which received only one use. Leftover food went to favored dancers, musicians, and hunchback jesters. Throughout the day, the emperor and his advisers walked the court, munching on snacks and sandwiches.

In 1520 during a celebratory feast, Díaz wrote of the shaping of corn tortillas into tacos filled with pork. Aztec table manners required the holding of a rolled tortilla in the left hand for dipping into a clay dish of *mole* (sauce) held in the right hand. The elite ended their meals with smoking and cups of hot cocoa.

In 1521, a 75-day siege from May 26 to mid-August ground down Aztec defiance of their conquerors. In his observations of this confrontation, Díaz mentioned cherries and figs as a relief from a steady diet of corn and as refreshment for combat casualties. For the beleaguered Aztec at Tenochtitlán, famine forced them to turn to lizards, rats, and snakes for sustenance. When those resources failed, Indians ate bark, grass, insects, leaves, moss, and roots and drank brackish lake water. Nonetheless, even perishing mothers and their toddlers glared at their conquerors and refused to plead for mercy.

After the Spanish victory over Montezuma on August 13, 1521, the death count from dehydration, disease, and hunger reached 240,000 Aztec and 30,000 of Cortés's Tlaxcalan allies. In celebration of the conquest, Díaz joined the feasting and revelry at Cuyoacan, the city center. Cortés rewarded the Aztec with haunches of enemy bodies salted to preserve them for cooking and eating. Spanish soldiers celebrated so excessively that Father Bartolomé de Olmedo,

chaplain of the expedition, had to discipline them.

A Soldier's Fare

On the march south toward Espiritu Santo Bay in Yucatán on the Gulf of Mexico on October 12, 1524, Díaz earned his commander's regard for foraging, a survival skill that kept the army healthy and strong. Upon arrival southeast of Veracruz at Chilapan province, the soldiers found the deserted city of Tamaztepec north of Tuxtla burned to the ground, but with granaries still intact and corn and fruit still in the fields. While resources allowed, the troops shed their gloom and ate well.

In these hard times, hungry marchers built a bridge over a three-day period, during which they survived on meals of grass and a root—*quecuenque*—that burned their mouths. The Mexican chiefs of Tezcucó and Tlacuba staved off hunger by baking native victims between stones until Cortés commanded an end to cannibalism. At a swamp, the expedition seemed doomed until Díaz returned from a foraging expedition with eight chickens, honey, beans, and 130 loads of corn. Soldiers pounced on the booty before the officers could intervene and mete out the provisions fairly.

During Lent in 1525, the paucity of provisions aroused suspicion and infighting. Díaz blamed the commander for failing to send an escort to guard the supply train. Fortunately, Díaz had the foresight to cache corn, hens, and honey to feed Cortés and his staff. To the commander's concern for the feeding of company priests, Díaz assured him that soldiers respected their confessors enough to save them from starvation.

On a second foray into the countryside, Díaz superintended 100 native porters carrying provisions. The Mexican chiefs detected that famine caused a breakdown in discipline and proposed a camp mutiny. When Cortés learned of the plot, he hanged the kings of Mexico and Tlacuba to set an example of order and recompense for the exploitation of hard times.

Local chiefs, viewing the greed with which an army could strip natives of their stores, urged the Spaniards to proceed to the Mayan town of Nito, Honduras, an eightday march crossing Guatemala. For provisions, the high command dispatched 80 men by canoe to outlying pueblos. Feasting and merrymaking

resumed at the stockaded pueblo of Izancanac (Palenque, Mexico) in Acalan province and at a subsequent hunt with the Mazatec of Oaxaca, which yielded 20 deer. As weary men toiled up steep slopes, their horses died from cuts and falls. The scanty trail food consisted of unsalted cabbage palm seasoned with pork.

Upon reunion with the Spanish community of Nito, Díaz reported an unappealing diet of fish, vegetables and *sapotes*, a creamy fruit similar in flavor to peaches. The arrival of a supply ship jeopardized the malnourished men, some of whom died from gorging on pork and other provisions. Foraging by raft deep into Guatemala along the Polochic River provided Mesoamerican staples—beans, corn, and cocoa—which Cortés rafted downstream to his camp. To sustain the colony at the port of Trujillo, Honduras, Cortés sent loot by two ships to Cuba and Jamaica to pay for livestock and plants to trade and to upgrade the diet of pioneers.

European Excess

Upon Cortés's triumphant return to Mexico, Díaz added to his descriptions of baroque court overindulgence with his recorded memories of a banquet held in Tenochtitlán's central plaza in June 1538. The sumptuous display set an example of Spanish snobbery and distaste for enchiladas, tamales, and other peasant cuisine. From sunset until after midnight, to the music of flute, harp, and trumpet, courses of dove, kid, oxen, pork, and marinated quail issued from the palace kitchen, accompanied by servings of beef and mutton, cabbage and turnips, and garbanzo beans. Ingenious presentations of platters took the form of classical tableaux. The opening of empanadas (turnovers) released live rabbits and birds. Servants poured chocolate from thousands of jars and served carob, mead, and spiced wine as prefaces to servings of blancmange and dessert trays of cardoons, cheeses, fruit, and olives. Montezuma himself sipped a vanilla-flavored chocolate beverage.

After Díaz's appointment in 1541 as governor of Santiago, Guatemala, he abandoned the military. At age 76, he began compiling his combat experiences to correct misinformation issued by Francisco López de Gómara, a former chaplain of the Cortés family and author of *Crónica de la Conquista de Nueva España*

(*Chronicle of the Conquest of New Spain*, 1522). Díaz's collected episodes form *Historia Verdadera de la Conquista de la Nueva España* (*The True History of the Conquest of New Spain*, 1632), a working-class view of Cortés's expeditions. Critics question Díaz's skewed European perspective but credit him with detailing Aztec food marketing, table manners, and cuisine.

See also: Aztec Diet and Cuisine; Manioc; Seaman's Diet and Cuisine.

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Dinner

A focus of sit-down communal eating, dinner is the main meal of the day as well as of festivals and religious banquets honoring holidays and special occasions. For the sake of hospitality, the assembled diners may groom their hands and hair, dress formally, and observe unusual protocol to honor the host. Diners may sit at appointed places, offer chants or prayers, and use more dishes, glasses, cups, and utensils than usual. Courtesy limits table conversation to prevent insults and squabbles.

Evolution of a Meal

The heavy meal in classical Rome, *cena* (dinner) followed the style of the Greek *deipnon* and latened from noon to early evening. Preceding service, hosts offered pinches of food at the home altar to the *lares* (guardian spirits) and *penates* (ancestral spirits). On divans in the *triclinium* (dining room), during the Roman

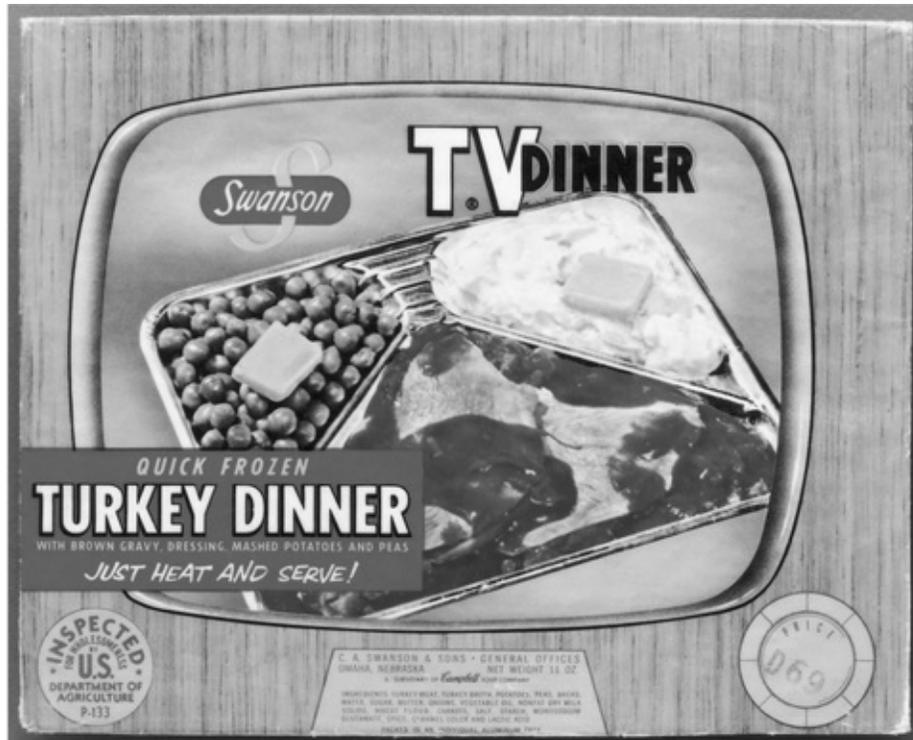
Empire, male and female patricians reclined to consume three courses of finger foods: *gustatio* (appetizers), *mensa prima* (main course), and *mensa secunda* (dessert).

To make the most of sunlight, medieval diners broke the workday with *prandium*, a prenoon meal, the first food of the day. Workers, who began work at daybreak, followed a set pattern of eating a smaller meal at nightfall shortly before going to bed. In abbeys ruled by canonical hours, the timing of food intake at None (mid-afternoon) and Vespers (evening) reflected set times for worship and prayers.

For feudal nobles, the noon dinner offered a dramatic setting for a display of power and ostentation, showcasing the presentation of heavily garnished whole beasts and main dishes carried by a procession of servants. Meat received the greatest obeisance. Carving and proper plating set a tone of dignity and civility.

In later centuries, the British trader and shopkeeper halted business around 3 P.M. for dinner. The tradition still honored by the Italian and Spanish siesta, set the pattern for two midday rush hours before and after dinner. The principal meal hour for the leisured classes advanced from 3 P.M. in the 1700s to an evening spread after 6 P.M. in the next century. Enhancing elaborate settings and table service, overhead candlelight and wall sconces softened lighting and created an intimate mood. The lateness of dinner generated a need for breakfast, which became ampler and more standardized in the late 1800s to satisfy the appetite during a long day.

In Japan in the 1830s, a gendered approach to dinner demanded that housewives stay home with the children while businessmen dined together in restaurants. Groups reserved banquet rooms and awaited a *table d'hôte*, or set menu, paid for in advance. To relieve the male-only tedium, geishas, professional hostesses, provided hospitality and sparkling conversation.



Swanson introduced TV dinners in 1954 with a Thanksgiving-style meal of turkey with gravy, mashed potatoes, and peas. At 98 cents each, the original TV dinner sold 10 million units in the first year—to the detriment of dinner table conversation. (*The Granger Collection, New York*)

In colonial North America, fieldworkers and schoolchildren gathered at home around noon for the largest meal of the day. The factory and mine whistles that announced work stoppage signaled homemakers of the regimented hours or half hours. Women introduced teatime as a polite, relaxing snack and social hour in late afternoon to stave off the hunger preceding dinner. By the 1840s, tea service fueled a demand for tearooms, a feminine business that expanded opportunities for women in baking, jam making, and food service.

After urban gas service and electrification altered the life rhythms of rural people, it became less necessary to eat the principal meal at midday. Children and laborers deferred to sack lunches and saved the major eating event for early evening, when house wives dished up a meat and two vegetables along with hot bread and dessert. For the gentry as well, an evening meal replaced the noon lunch in importance. Evening entertainments and theater performances kept the moneyed class up later and generated a need for supper, a small dinner served as late as midnight.

In the early 1900s, dinner service in the United States took place by 4 P.M. for factory workers and miners and around 6 P.M. or later for white-collar workers. Jewish families gathered at sundown on Friday for a Sabbath meal enriched by symbolic blessings of children and food, candles, and *kiddush* (prayer). Braided challah (egg bread), carrot stew, and fragrant fish or meat soups accentuated the ritual, which dated to ancient Babylonia.

Modern Adaptations

The evening dinner hour defined household timeliness and togetherness in the Western world until the late 1940s, when families began abandoning seven-day-a-week rituals for five-day-a-week home meals and fast food on weekends. Simultaneously, snacks randomized hunger and fulfillment and diminished the camaraderie of the nuclear family.

In Peoria, Illinois, in 1954, C.A. Swanson & Sons designer Gerry Thomas responded to a surfeit of Thanksgiving turkeys by inventing the TV dinner, a covered, three-compartment serving for one. Heated in the oven, it resembled an airline dinner. Young and old took their individual servings to metal trays in the living room or den to eat while watching television. In 1955, at the height of *I Love Lucy*, *The Lawrence Welk Show*, and *What's My Line?*, the company sold 10 million TV meals.

At a cost of 98¢ each, the Swanson frozen time-saver allowed families a choice of fried chicken, haddock filet, meatloaf, Salisbury steak, or turkey. Banquet, a competitor in Omaha, Nebraska, augmented selections by packaging meat pies, chicken breast tenders and wings, and fruit pies. In 1958, Freezer Queen of Buffalo, New York, entered the frozen dinner market and pioneered onion gravy and broccoli in cheese sauce. Amid dinnertime innovations, home economists warned that convenience meals were replacing home cooking with conveyor belt gastronomy.

With the advent of microwaving in the late 1960s, plastic trays replaced aluminum. In 1973, Swanson's "Hungry-Man" dinners offered larger portions and selections ranging from charbroiled Angus beef sandwiches and chicken strips to beef enchiladas, fried chicken, lasagna, pork ribs, spiced ham, steak, and veal

parmigiana. A twenty-first-century communication revolution interrupts meals by cell phones and iPods, which draw the attention of youth from dinner to social networking.

See also: Beans and Legumes; Cereal; Feasting; Luau; Salad and Salad Bars.

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[Disease, Food-Borne](#)

In addition to hydrating and nourishing the body, edibles also harbor fungi, parasites, and pathogens, some of which cause critical illness, long-term impairment, or death. Historically, sickness from food and water has weakened populations from early times. A common cause of epidemic results from polluted food and water sources, such as the contaminated drinking water in Babylon that spread typhoid to Alexander the Great and his forces and cholera in India during seasonal floods between 1900 and 1920, which killed 8 million people. Additional epidemics dot history: *Serratia marcescens* in medieval Eucharists that inflamed eyes and urinary tracts, giardia in Christian crusaders in Palestine during the eleventh and twelfth centuries, ergotism among victims of seventeenth-century witch trials, and dysentery that killed prisoners of war during the American Civil War.

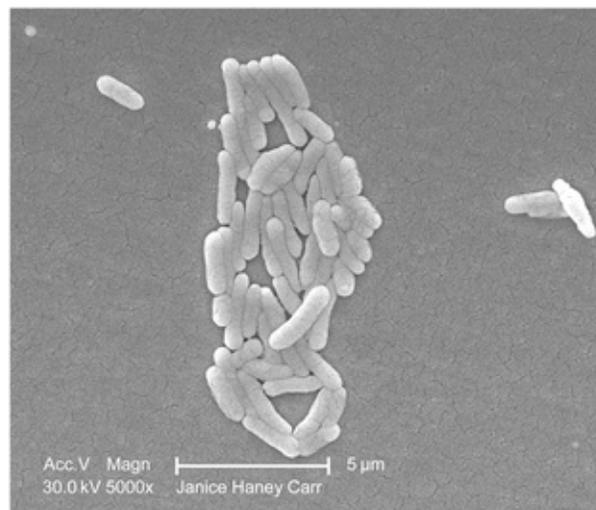
Global food distribution, combined with spotty inspection of edibles, increases the flow of tainted goods to consumers. The sources of contamination appear at all stages of the handling of produce and meats—picking, washing, transporting, processing, warehousing, distribution, cooking, and consumption. One example, scombrototoxin, from bacterial decay of tuna, can inflict diarrhea and vomiting, headache, muscle cramp, and even blindness. Symptoms of brucellosis, a milk-borne disease carried by dogs, camels, cattle, goats, and pigs, may include flu-like chills and fatigue, joint pain, swollen glands, and weakness. Unlike most food-borne disease, which passes within days, brucellosis may cause relapses over several years.

A daunting list of bacteria, fungi, parasites, and viruses—Creutzfeldt-Jakob disease, *Cryptosporidium parvum*, *Giardia lamblia*, hepatitis A, *Listeria monocytogenes*, norovirus, *Rotovirus gastroenteritis*, shigellosis, *Staphylococcus aureus*, and trichinosis—can corrupt food and pass through the mouth and stomach to habitats in intestinal walls and the bladder, heart, kidneys, liver, and lungs. Infectious hepatitis, which can originate in polluted shellfish, causes jaundice, a yellowing of the eyes and skin that may last for months. Some 25 percent of victims of listeria incur the disorder from deli meat and hot dogs and die from meningitis. The deadliest food-borne contagion, *Clostridium botulinum*, generates a paralytic toxin in canned foods that are heated at temperatures too low to kill bacteria. Most at risk are infants, the elderly, pregnant women, and patients suffering from diabetes, human immunodeficiency virus (HIV), lupus, radiation depletion, or other immune suppressants.

The most common food-borne threats come from *Campylobacter jejuni*, *Escherichia coli* (*E. coli*), and *Salmonella typhimurium*. *Campylobacter* bacteria thrive in raw poultry and inflict serious gastrointestinal suffering from Guillain-Barre syndrome. *E. coli*, a bacteria that lives in ruminants, enters human food or water through fecal contamination. Gut impairment can result from hemolytic uremic poisoning, a preface to anemia, bloody dysentery, and kidney failure. *Salmonella*, a third food-borne bacteria, lives in birds, mammals, and reptiles and enters the body through polluted water, infected meltwater from frozen poultry, and unclean kitchens. In healthy people, the discomfort is chiefly short-term fever, abdominal cramps, and diarrhea; in compromised immune systems, the disease infects the bloodstream with lethal sepsis.

The norovirus, a more difficult diagnosis, initiates vomiting and inflammation of the alimentary canal. Because the pathogen passes between humans, investigators tend to locate the origin in food handlers and waiters who cut and arrange salad bars and sandwiches. The outbreak reaches endemic proportions at gatherings, such as catered receptions and family reunions, or from service of infected food at delis, grocery stores, hospitals, prisons, restaurants, and schools. Another source of contamination comes from the hands of seafood harvesters and sorters who unknowingly infect clams, mussels, oysters, and other filtering shellfish.

Annually, food-borne illness afflicts 30 percent of the world's people. Over 48 million Americans incur disease from eating and drinking, most commonly from salmonella. Of these, 3,000 die and 128,000 enter hospitals. Tracking by the Centers for Disease Control and health departments begins with a culture of stool samples. Before the specimens produce verifiable pathogens, individuals remedy dehydration from loss of body sera and electrolytes with extra fluids. More serious treatment combats fever and intestinal bleeding. Physicians cautiously prescribe antibiotics because of the emergence of such resistant strains of bacteria as methicillin-resistant *Staphylococcus aureus* (MRSA).



A colorized photomicrograph, at a magnification of 5000x, reveals a cluster of salmonella bacteria linked to an outbreak of food poisoning in spring 2008. More than 1,300 cases of salmonellosis were reported in 43 states. (CDC/ Associated Press)

Clustered illnesses require graphing of victims, their meals, and the places

where they may have encountered or purchased contaminated food or water. For example, *Giardia lamblia*, a zoonotic transmitted from beaver, cows, deer, and sheep, may infect consumers of well water or swimmers in ponds and wilderness streams. Statistical evaluation of toxic ingredients leads to original sources, such as salmonella from a single poultry farm or alfalfa sprout grower, or *E. coli* from hamburger ground on unwashed abattoir equipment and marketed by a chain grocer. Inspectors look for contaminated cutting boards and field and orchard collection baskets as well as points of recontamination from animal blood, raw shellfish, and unpasteurized eggs, juice, or milk.

In 2010, the U.S. Food and Drug Administration introduced standards intended to reduce bacterial infection of foodstuffs and water by 60 percent. In July 2010, egg producers installed new precautions against *Salmonella enteritidis* involving bird sanitation and egg storage and initiated additional safeguards intended for completion over the next two years. Veterinarians contributed safety policies regarding slaughtering and processing of poultry, beginning with preventive medicines for flocks. The Partnership for Food Protection mandated similar upgrades in sanitation involving restaurant inspection and domestic and imported baby formula, pet foods, and fruits, such as the Mexican papayas that caused a salmonella outbreak in 23 states in July 2011.

See also: Alcoholic Beverages; Allergies, Food; Inspection and Safety, Food; Pork; Veganism; Vegetarianism.

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Dried Food

Whether by natural sunlight, oven, or open fire, the drying of food, the world's first preservation method, extends table use by slowing enzymatic action and removing sources of infestation and spoilage. In prehistory, hunter-gathers in Asia and the Middle East relied on solar energy to preserve berries, fish, game, nuts, seaweed, seeds, vegetables, and vine fruit. In Armenia, fruit purees dried in the sun into *bastegh* (fruit leather), a thin, malleable layer that preparers cut into slices for storage in jars. Perishables also dried on a smoking rack, among rocks, on a spit, in a rock pit, on a parching tray, or in a shell or clay container. In heat and smoke, fish, meat, plantains, and yams shrank from extraction of up to 80 percent of liquids. The resulting food remained high in energy and fiber and low in fat.

Ancient Fare

From 11,000 B.C.E., Paleo-Indians dried and smoked berries to season fish, turtle, and venison stews. Shrinkage of jerky and fruit leather on birch bark trays or wooden slabs increased the value of both as barter items and pack food. Similarly, Libyans and Ethiopians bartered with lake salt, which they dehydrated in brackish pools. Yogurt, first coagulated naturally in Sumer in 6000 B.C.E., dehydrated into a traveler's snack. Armenians and Egyptians spiced and wind-dried camel and goat meat for *pastirma*, a ready-to-eat meal requiring intense chewing. From 2100 B.C.E., south-central China evolved a cuisine noted for the robust flavor of dried vegetables. By 1500 B.C.E., the Babylonians and Chinese air-dried sausage, a meat preservation technique that involved blending ground meat with salt, spices, and sugar.

Dehydrated produce lasted longer than salt-dried or smoked food and weighed up to one-third less than fresh. In sub-Saharan Africa, traders packed palm oil and lightweight dried cereal, copra (coconut meat), and fish for transport by major waterways. The yield of the floodplain and amicable relations in river ports enabled vendors to supply dense populations, which developed into the continent's first city-states—Gao in the Songhai Empire, Jenne-Jeno in Sudan,

Timbuktu in Mali, and Zanzibar.

Between Iceland and Scotland in 1000 B.C.E., Faeroe Islanders made dolphins, porpoises, and long-finned pilot whales a staple of their cuisine by salting and air-drying the meat and flavoring it with dried fish as a condiment. On the island of Tonga in the same era, Polynesian cooks used pottery jars for parboiling fish in herbed water to ready the meat for drying. For ritual sea voyages by double-hulled canoe or outrigger back to Tahiti, mariners packed desiccated coconut pulp and fish as “canoe food.” Along the Mediterranean, Hesiod’s *Works and Days* (700 B.C.E.) described the air-drying of grapes to temper the flavor before packing them in terra-cotta jars.

The concept of air-, fire-, and sun-drying cuts of meat suited the needs of desert nomads, pueblo dwellers, and Phoenician seafarers, who carried compact, lightweight meals on journeys around the Mediterranean. On Crete, the sun-drying of wheat stirred into sour goat or sheep milk yielded *xinochondros*, a stabilized breakfast food dehydrated into nuggets in large trays. From the first century C.E. in Arizona, Hohokam laborers ensured winter rations by gathering 175 pounds (80 kilograms) of dried mesquite pods a day for storage. The *garambullo* cactus (*Myrtillocactus geometrizans*) provided the Hohokam and the Apache, Papago, Pima, Sinagua, Tewa, and Ute with a grape-sized berry that they dried like raisins for sweetening *pinole* (corn porridge).

For indigenous people in temperate to tropical climes, dried foods held up to changes in humidity and temperature. Indians in Santiago, Chile, valued the daylily, the root of which they dried in an oven and ground into meal for making pastries. In the Great Basin, the Cahuilla and Maricopa sorted and dried cactus blossoms for dipping in syrup. The Pomo of northern California dried seaweed on the beach to serve in tortillas or to fry in oil. California and Colorado Indians braided ears of corn and spread them on adobe roofs in the sun before stacking them in rock-lined pantries. Mission Indian women commandeered the caching and drying of acorns, the chief carbohydrate.

To the east, Middle Atlantic and New England growers buried sacks of corn ears, parched kernels, and corn smut, along with strings of dehydrated pumpkin and squash slices, to supply them during winter. The Iroquois of Canada and New York extended the use of surplus corn by charring it and burying it in bark-roofed caches. Among the Timucua of northern Florida, the drying of squash

strips into curls and the roast-drying of oysters guaranteed plentiful stores during hurricane season.

North of the Aswan Dam in Egypt, the Kubbaniya survived famine by caching smoke-or sun-dried fish for up to five months. Honeyed and salt-dried jerky supplied the tombs of Amenhotep II and Thutmose III with grave goods. In Hokkaido, Japan, processors boiled seaweed in iron kettles filled with fresh water before drying fronds on bamboo racks. The Inca of Peru trimmed bone, fat, and gristle from cattle, deer, elk, horse, and llama muscle and heat-dried it to produce dense, lightweight meals. After salting the rumps and shanks, Inca processors sun-and wind-dried them into *charqui* (jerky). In Kamchatka, Russia, hunter-gatherers added cloudberry, cranberry, crowberry, raspberry, whortleberry, and wild garlic to sweeten a diet of dried salmon and trout. Cooks softened dried fish by dipping it into salmon oil.

During the Iron Age, after the Chinese and Japanese fished or “jigged” for cuttlefish and squid at night by lantern light, they dried the meat for barter or sale. Celtic hunter-gatherers from the British Isles to Eastern Europe depended year-round on dehydrated currants, heather, rowan berries, and seaweed. For winter, they stored beechnuts and hazelnuts, flax, and dried bilberries, dewberries, and hawthorn and juniper fruits in sealed containers. Herbs suspended in warm, airy environments remained flavorful and easily shredded for adding to crab apple vinegar and sloe and wild plum wine.

From 400 C.E., the Chinese extended papermaking technology to drying seaweed in strips. After pulverizing it, they made stock to thicken meat dishes or simmered seaweed in vegetables or rice to produce a taste like anchovies or caviar. In Iceland during the tenth century, Norse chieftains favored dried dulse as a fiber food. The Irish cached dehydrated seaweed to cook in fish dishes, oatcakes, and potatoes. Healers recommended dried or powdered dulse in the diet for the fluoride content, which prevented dental cavities. In Scotland and the Hebrides, fishermen and crofters relished dried and stewed seaweed as a vegetable or condiment and as forage for sheep. In storage sheds, they draped dulse and carrageen for air-drying.

Middle Ages and Renaissance

During the Middle Ages, preservation of food by desiccation in a still house became a cornerstone of the economy and general well-being. Afghans dried mulberry cakes to spend like coins. Similarly, Norwegians dried cod as the basis of their food industry and as currency. Stores from Ribe, in Jutland, packed easily on ships and sold well in Asia, Greenland, and Western Europe. According to *De Cultura Hortarum* (*On Gardening*, ca. 840), author Walafrid Strabo, a Frankish monk, dried plants at Reichenau Abbey to maintain wellness through regulated digestion. Early medieval dairiers in Benedictine and Cistercian monasteries in the Alps and throughout northwestern Europe stored curd products as a substitute for forbidden meats and extended their shelf life by brining, drying, or smoking. Before cooking, preparers soaked curds in milk, dehydrated fish in water, and dried fruit in brandy or wine.

Dehydrated goods provisioned armies and fleets. During the First Crusade, after 1096, Christian supply trains imported dried fruit to the Middle East as a source of energy and nourishment for badly malnourished troops. *The Travels of Marco Polo* (ca. 1300) described sun-dried milk as an on-the-march paste consumed by the Tatar forces of Kublai Khan. Chinese sailing crews ate dried ginger rhizomes to prevent seasickness and consumed oysters desiccated in seaweed. On long trading missions, both foods remained free from fungus and decay.

After 1492, the age of voyages introduced the Spanish to Native American pantry stock. The dehydrated vanilla bean entered world cuisine in the Totonac diet of Veracruz. Curing began with blanching the beans in hot water and sun-drying them to one-quarter the former weight. On a larger scale, the Olmec and Tarahumara of north-central Mexico stockpiled their staple, dried corn on the cob, in desert pits. Taíno bread makers dehydrated cassava to shape into loaves on clay griddles. For Aztec women, grinding dried corn involved kneeling at a stone mano and metate and pressing the roller until it crushed hard kernels into meal. In another labor-intensive preservation task, the Inca of Peru sliced llama meat for drying and tenderized the strips by pounding them between stones. Desiccation promoted a long shelf life in stone silos and ware houses and portability in pouches for journeys.

The Carib of the West Indies considered food drying a daily chore. They built sheltered food storage near their homes and vented air-drying and smoking

through the unthatched sides. To perform the daily job of drying and pulverizing corn into grits, Spanish explorer Hernando de Soto approved the kidnap of Indian women as slave labor in 1539. Three years later, after his expedition advanced northwest to Hot Springs, Arkansas, the troops located a wealth of dried beans, corn, and plums and added the goods to military stores for the captive women to cook.

During the Renaissance, food dehydration extended to more than fish, fruit, grain, and meat. The poorest of England's 4 million subjects turned ground dried peas into maslin (brown bread) or horse bread, the lowest grade of baked loaves.

Among Japanese fishermen in Kuzaki on Enshu Bay east of Osaka, sacred offerings of seafood required a special preparation of the abalone catch. They excised the circular abalone muscle in an unbroken strip and sun-dried the length for home use. They also secured dried sardines in lidded baskets and air-dried shiitake mushrooms to ready the house hold for a New Year dinner. Dried tofu accompanied the tea service in the late 1500s as a complement to the beverage. Hosts mixed tofu blocks with chili sauce, dried shrimp, onion, or soy sauce for breakfast. In the Philippines, dried tofu topped with palm syrup produced a sweet dessert.

In 1607, the 45 English adventurers from the Virginia Company of Plymouth returned home with a store of dried greenbrier (*Smilax regelii*), the source of sarsaparilla. The drink proved popular in England because of rumors that it cured venereal disease. In 1620, the Pilgrims of Plymouth, Massachusetts, learned from returnees at Popham colony at Sagadahoc, Maine, how to survive hunger during dire winters. In imitation of coastal Algonquins, the English garnered clams and oysters and bartered quahogs (hard clams) with inland tribes.

During the 1600s, when salt was inexpensive and families awaited fresh catches of cod for drying and sale to fleets, a high rate of death from scurvy sapped Portuguese naval strength. On voyages to Brazil, Guinea, and India, mariners received measured amounts of baked biscuit and dried cod, the standard sailor's fare, which lacked ascorbic acid. In addition, the ship's cook laid in stores of almonds, lentils, prunes and raisins, and sardines. For sickbay meals, they reserved the dried fruit, which had limited effect on bleeding gums and flaccid muscles.

For long voyages, Spanish sailors converted Pacific island goats into *carne seca*

(dried meat) to stock their galleys with an adaptable jerky. In reference to the drying method, in *The Generall Historie of Virginia* (1624), Captain John Smith named the technique “meat jerking.” Hunters of the North American plains rack-dried enough buffalo meat for clan provisions and barter. Packing the jerked flanks with mint discouraged vermin during caching. Preparers sliced cured fat, suspended from the smoke hole of a lodge, and used dehydrated slabs like bread for jerky sandwiches.

Food for Colonies

The colonial era revealed to Europeans the preservation methods of indigenous people. In the Caribbean during the seventeenth century, food writer Gonzalo Fernández de Oviedo observed the Arawak, Carib, and Taíno air-drying alligator and fish on racks of bearded fig wood raised on saplings. The Pee-Posh of the lower Colorado River, the Yukon of northwestern Canada, and the Hare of Alberta and Alaska added pantries to the hogan, igloo, or lodge as storage space for baskets of dried berries and grain or as a shelter for dried plums and herbs and smoked meats and fish. Rising heat from hearths protected the foodstuffs by preventing moisture from invading them.

Cooking styles passed from Indians to white settlers, who had limited experience with survival food. According to the writings of philosopher and provincial founder William Penn, Pennsylvania Indians taught settlers how to dry and beat corn kernels and boil them in water to produce hominy. Native women demonstrated how to crush corn with a pestle in a hollow log mortar. By placing a flat stone on top of the corn and pounding with a stone hammer, workers reduced labor and waste and produced an evenly crushed meal. Native cooks mixed the meal with water and shaped the dough into corn cakes for wrapping in corn shucks and baking in ashes.

Among most North American Indians, trade in surplus corn and dried fish augmented supplies for winter, when red meat was scarce. The Canadian Huron gathered and air-dried berries, corn, and sweet prairie turnips (*Psoralea esculenta*). At Patuxet, Massachusetts, on November 16, 1620, Miles Standish and his hungry followers pounced on a basket of dried cranberries and bushels of

husked Narragansett corn, a staple that the aborigines of southern New England had grown since 700 B.C.E. The discovery impressed on naive English settlers the importance of dehydrating food for hard times.

Heat-drying shortened the desiccation process while protecting foodstuffs from inclement weather and infestation. Quebec masons built semi-indoor ovens and flues, in which rising heat dried bean pods and grain sheaves to ward off mildew and yeast and dehydrated strings of beans and peppers, bags of chestnuts and peanuts, braided onions, loops of pemmican, tubers and herbs, and rounds of pumpkin and winter squash. In imitation of native industry, settlers of Canada's Grand Banks and New England initiated global trade in rack-dried flounder and hake, which acquired a smoky savor from the drying process.

The tea trade encouraged complementary food business in dried leaves, milk, and sugar. After 1706, Eastern Europeans developed a tea culture from Lapsang souchong, a tea smoke-dried in bamboo baskets over pinewood fires. The strong, savory leaves traveled by camel caravan on a 6,000-mile (9,600-kilometer) route through Russia, thus raising prices for supplies of chai (tea blended with sweetening, spices, and milk). Complementing hot tea, plantations in Barbados and the Virgin Islands chopped sugarcane for dehydration. After sun-drying and curing in tins, the hardened crystals passed to wind-powered pounders, which smashed hard sugar into coarse, crunchy chunks. The hang-drying of calf stomachs preserved rennet for the curdling of milk into sour cream, an English additive to tea service.

Establishment of a penal colony in New South Wales on January 26, 1788, necessitated the preservation of foodstuffs until English prisoners and soldiers could acclimate to their island habitat. In Queensland, the newcomers observed Australian Aborigines air-drying tropical waterlily roots and yams. In a world apart from Aborigines, the English fed themselves temporarily on a two-year stock of cheese and dried beef. In Tasmania, settlers dehydrated goat meat, mushrooms, underground fungus, and brined fish. They also air-dried apple slices, the beginning of a world export business in dehydrated pome fruit.

Dried foods quickly increased the economic stability of New World settlements. In his treatise *A Description of Greenland* (1818), travel writer Hans Egede observed the Inuit cuisine and reported the consumption of boiled, dried, and raw meat from hares, partridges, and reindeer and of air-dried halibut and

salmon roe. The convenience of desiccated food generated a demand for commercial stocks. In British Columbia in 1827, the Hudson's Bay Company added dried salmon to trade offerings of jerky and pemmican.

Brisk Atlantic trade between Great Britain, the West Indies, and the American ports of Charles Town, Boston, New York, Newport, and Philadelphia required constant surveillance to protect stores of dried fish. Emulating the ramadas of Southwestern Indians, frontier families constructed brush arbors and slatted sheds facing south to maintain the texture of dried meat. Daily inspection and excising of spoiled tissue prevented rot from destroying the entire batch. Turning ensured even dehydration of thicker portions.

Technical Advances

To primitive guesswork, science contributed new methods of drying and processing foods. German organic chemist Justus von Liebig made artificial human breast milk with proportional blends of carbohydrates, fats, and protein in a farinaceous food called Liebig's Soluble Food for Babies. In 1867, his Registered Concentrated Milk Company in London shipped the simulated mother's milk to American and European markets. Liebig followed the liquid version with a powder of dried cow's milk, malt and wheat flour, and potassium bicarbonate for reconstitution with milk and water. A letter to the *Medical Times and Gazette* in 1877 proclaimed the formulation a boon to children for its ease of use and nutritional value.

In Chicago in 1887, advertisements for pharmacist James Horlick's malted milk, another form of dried milk combined with dried sprouted barley, promised health benefits in a nonperishable dairy food. The powdered product, the forerunner of Ovaltine, proved more popular with polar explorers than with babies. In the 1890s, Nestlé's Milk Food debuted dried milk especially for hot weather infant feeding. Magazines introduced the product to mothers by mailing samples to readers and hyping a product reputedly more beneficial than the milk of wet nurses.

World War I and the Great Depression produced the first global demand for dried foods. During the rationing of World War II, 160 dehydration plants went

into operation in the United States. Factories produced food more calorically dense than fresh produce but lower in vitamins A and C, which air and heat destroyed. Batchelors, a leader in food desiccation in Sheffield, England, excelled at the production of noodles, peas, and soups, the forerunner of Lipton's Cup a Soup. Dehydration of food stocks brought to the homemaker's table powdered egg yolk, fruit, milk, and soup. In lieu of tea, older children thrived on high-energy fruit juice, dried fruit, and chocolate. Pregnant and nursing women drank a pint of reconstituted dried milk a day.

The end of war time rationing did not halt the sale of dehydrated food. By the 1970s, imported goods from Australia and New Zealand initiated a vigorous competition from the Southern Hemi sphere in frozen and dried berries. Warehousing of dried foods kept stocks at hand for emergencies and weather disasters. In the 1990s in India, where 62 percent of children suffered malnutrition, impoverished families received infant formula and dried milk dispatched by charitable outreaches, including CARE and UNICEF.

Today, desiccation methods continue to extend the life of foodstuffs, such as the roof-drying of tomatoes in Italy and breadfruit in Sri Lanka. In Rajasthani cuisine from northwestern India, *pachrangi* dal features five types of dried legumes in proportion. For the Inuit of North America, the world's purest hunting society, a protein-and fat-focused regimen ranges from rack-dried capelin and ptarmigan and kittiwake eggs to smoke-dried bowhead whale and reindeer tongue. For the Pribilof Islanders on the Bering Sea, dehydrated salmon and eider ducks provide winter subsistence. An Icelandic delicacy, *hákarl*, requires the curing in sand and the hang-drying of basking shark for up to 20 weeks. An Icelandic buffet features liver sausage as well as wind-dried cod and haddock.

In Polynesia, the hazard of cyclones and freak winds necessitates emergency food reserves. The cooks of Oceania sun-dry or smoke-dry snapper and tuna, which also supply voyagers on canoe expeditions. The light pack weight of dried bread mix, milk, cereal, rice, and instant tea enables rescuers to ferry sustenance to areas plagued by famine, flood, epidemic, and siege.

See also: Caching; Curing; Fish and Fishing; Freeze-Drying; Jerky; Liebig, Justus von; Sausage; Standish, Miles; Tea.

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Dubois, Félix Urbain (1818-1901)

In 1869, French chef Félix Urbain Dubois popularized *service à la russe*, the presentation of dinner in separate courses on individual plates rather than in grand displays. He based his early style on the example of master chef Marie-Antoine Carême. Dubois gained renown for architectural creations adorned with inedible ferns and animal statuary to entertain and amuse diners. For home-style reference, he compiled *Le Livre de la Ménagère; ou, Petite Encyclopedie de la Famille* (*The Book of the House keeper, or Small Encyclopedia for the Family*, 1870), a practical handbook on the coating and saucing of meat for 180 family menus.

With his two-volume *La Cuisine Classique* (*Classic Cookery*, 1856), coauthored by Émile Bernard, the cook of Napoleon III, Dubois contributed to gastronomy a respect for food at the height of readiness. At St. Petersburg, he developed the concept while serving from 1850 to 1869 as head chef of Prince Nikolai Alexeevich Orlov, the worldly Russian ambassador to Belgium, Britain, France, and the Austro-Hungarian Empire. Dubois remained on the prince's staff during the Congress of Paris of 1856 at the end of the Crimean War, a peak of prominence that involved the chef in constant social and political activity.

The revolutionary shift in table decor affected all aspects of cookery. The former French style of plating presented hot dishes and cold dishes in separate batches. The grouping of entrées, a leftover of the Middle Ages, allowed the heated platters to cool and the cold specialties to wilt under warm candlelight.

Dubois chose to serve individual entrees one by one at the height of edibility.

A model of Dubois's Russian-style entrées, veal Prince Orlov consisted of a braised loin sliced into thin leaves and interlarded with a puree of mushrooms and onions. For the finished dish, Dubois topped the meat with béchamel (white sauce) and broiled the surface into a brown crust.

In retirement in the 1880s, Dubois continued traveling between Nice and Monte Carlo to dine at the Grand Hotel and propose recipes for his collection, *La Cuisine d'Aujourd'hui: Ecole des Jeunes Cuisiniers (Today's Cuisine: School of Young Cooks, 1897)*, a standard culinary text. Commentary explained the etymology of culinary terms, including the union of firm and soft dough to make *pain bâtard*, or torpedo loaf. His mentoring of Auguste Escoffier influenced the wealth of European restaurants that opened in the early 1900s.

See also: Escoffier, Georges Auguste.

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[Durante, Castor \(1529-1590\)](#)

Italian court physician and botanist Castor Durante da Gualdo compiled an influential guide to diet and wellness in the sixteenth century.

Born at Gualdo, near Spoleto, Durante came of age at the height of Renaissance interest in global foodstuffs and cuisine. A man of his time, he completed medical studies at Perugia and called himself a "*cittadino Romano*" (Roman citizen). In 1567, he became Gualdo's town doctor.

Under Vatican patronage of Pope Gregory XIII, Durante wrote works on diet,

hygiene, and rest. For invigoration of the senses, he urged the pope to exercise outdoors. Durante's texts advocated meals of hedgehogs and rats and extolled frog meat as a cure for snakebite. His culinary advisories featured easily swallowed foods as well as the use of tobacco, a leafy North American plant, as a cure-all for pulmonary distress. At issue among his contemporaries lay questions of meal organization and service, particularly the placement of salads and sweets among courses. Because of Durante's felicitous writing style and succinct advice on therapeutic food concerns, his books went through numerous editions and translations. His popularity as an adviser on herbalism earned him a papal appointment and a university chair at Salerno.

In 1565, Durante published in Latin hexameters *De Bonitate et Vitio Alimentorum Centauria* (*On the Goodness and Medicinal Faults of Foods*), a handy guidebook subtitled *How to Preserve Health and Prolong Life; Treating Nature, Food, and Remedies for Illness*. Translators rendered the text in Italian under the more familiar title *Il Tesoro della Sanita* (*The Treasury of Health*, 1586), a common reference manual for medical doctors.

Durante opened his discourse with comments on air quality and suggested leaving bread in the open to gauge humidity and the presence of air pollutants. The scholarly dietary organizes tidy entries on wheat, pasta, and bread and covers beans, chickpeas, lentils, greens and spinach, asparagus, herbs, lettuce, radishes and carrots, and mushrooms. Each entry makes claims about the aspect of wellness that individual foods bolster, such as the pharmacological wonders of salads and vegetable medleys. Durante valued borage for relief of depression and for enhancement of memory, a belief anchored in the classical Greek writings of Dioscorides and Hippocrates.

Durante fostered a proactive diet. He recommended eating salad at the beginning of each meal. Of songbirds as entrées, he preferred the thrush, especially the ones fed on aromatic juniper and myrtle berries. He favored boiling rather than roasting meat and recommended using beans only as accompaniments to other ingredients. Of fava beans, he warned that they encouraged a limp sponginess in muscle tissue. His recipe for dried broad beans required skinning them to rid them of indigestible cortex and pounding them before simmering in leeks, onions, oil, and spices. The addition of oregano and fennel discouraged dyspepsia and flatulence.

Concerning the *pomi d'oro* (tomato), a recent import from New World gardens, he advised preparing it, like eggplant, with oil, pepper, and salt. Like most Europeans, he doubted the nutritional value of the tomato and blamed *tartufi*(potatoes) for head and nervous disorders, but he repeated the common belief that potatoes fostered sperm production.

Durante's orderly listing of fruits, nuts, oils, and condiments preceded a gradual lead-up to fish, poultry, and red meat. The herbalist recommended the meat of birds over mutton and veal from quadrupeds. He valued game above domestic meat because wild animals exercised in fresh air and ate from nature. He believed that wild meat enlivened the human vascular system. Like the ancient Greek physician Galen, Durante advocated pork for its food value.

More significant to health was his lengthy discussion of water and wine. To prevent an imbalance of the body's humors, he disallowed cooling wine and water with ice or snow. In a society where popes and eminent prelates flaunted gluttony, Durante's work advocated prudence and body wisdom about the combinations and quantities of foods needed for health and satisfaction. As the physician to Pope Sextus V, Durante espoused frugality and temperance.

Durante's first publication flourished for a century. He followed this with the illustrated *Herbario Nuovo* (*New Herbarium*, 1585), an A-to-Z study of more than 900 plants and their value to nutrition and healing based on classical and medieval dietary theory. Published in Venice, the herbarium went through four revivals. The woodcuts, drawn by teen wonder Leonardo Parasole Norsini and engraved by Parasole's wife Isabella, provided elegant detail of species, flower, and fruit. Interest in Durante's comments on spices illustrated the involvement of Venetians in the spice trade and advances in the spicing of food.

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[Dutch East India Company](#)

The world's first stock company and first multinational corporation, the Dutch East India Company monopolized the Indonesian pepper and spice trade from 1602 to 1769. Known in Dutch as the Vereenigde Oost-Indische Compagnie (VOC), the conglomerate originally traded with Asian colonies. At its height, the company operated 4,785 vessels and employed 1 million laborers to trade millions of tons of merchandise from Asia. Central to the company's success, the dispersal of pepper to the West altered the aroma and flavor of cooking, giving it a new pungency, particularly in Chinese cuisine of the Wanli dynasty. Beverages acquired a sharp tang and lasting aftertaste from a sprinkle of pepper grains. For two centuries, VOC investors earned dividends of 18 percent until the firm's bankruptcy and dissolution on December 31, 1800.

To best its Portuguese competitors, stockholder Jan Huyghen van Linschoten and explorer Cornelis de Houtman began seizing trade routes along the Javanese north shore in 1580. De Houtman reached Bantam (now Banten), West Java's main source of the extra-hot long pepper, a staple of Indonesian cooking and of Indian vegetable pickling for its supposed effects on human longevity. The most profitable regional commodity, pepper passed from European warehouses to condiment shops in Poland, Russia, and the Ottoman Empire.

For centuries, the Egyptians had prized pepper as an ingredient in embalming fluid; in India and China, healers had valued pepper as a restorative of appetite, energy, and sexual potency. As a pharmaceutical, pepper soothed the digestive tract, heart, liver, and throat and relieved cholera, colic, diabetes, dysentery, epilepsy, fever, malaria, pruritus, toothache, typhoid, and vertigo. Largely from pepper sales, the VOC gained the power to print currency, construct forts and colonize lands, negotiate treaties, raise armies, and declare war in its territories, the Dutch East Indies.

A Profitable Monopoly

In March 1599, Captain Jacob Cornelius van Neck's eight-ship fleet reached the Malukan Spice Islands in eastern Indonesia. He quadrupled investors' funds from profits on 500 tons (450 metric tons) of cloves and pepper, plus stores of cinnamon bark, a fumigant and cure for chapped lips, halitosis, inflamed gums, and low sperm count, and of mace and nutmeg, a meat preserver and an aphrodisiac extracted from the same nut. At the time, cloves cost three times the price of pepper; mace and nutmeg cost even more.

The Dutch created a cuisine that added grated nutmeg rind to beans, brussels sprouts, cauliflower, cider, eggnog, pudding, sausage, and wine. Continental Europe ans prized the spicy aroma and flavor in baked goods, potato dishes, sauces, and soups and for seasoning meats. Mace, the outer aril (covering) of the nutmeg, yielded a more delicate taste and smell as well as oils for use in preservatives, sweets, syrup, and treatments for diarrhea, enlarged heart, halitosis, seasickness, and skin rash

In 1600, Dutch traders negotiated a monopoly on pepper and cloves from Hitu at Ambon in the Molucca chain, where fleet commander Steven van der Hagen seized control. Following the formation of the British East India Company in 1600, the Dutch organized their own cartel in 1602, which headquartered at Bantam, a prime nexus of international commerce. Two years later, 65 more Dutch traders strengthened the Netherlands' presence in the Asian trade and introduced barter with the Chinese for tea in exchange for dried sage, which the Dutch promoted as a cure-all. By 1611, the VOC boosted business by opening a second outpost at Batavia. The governor-general, posted at Ambon, superintended trade wars against the Chinese and the English, who headquartered in Java and Sumatra.

Fighting Competition

The food trade wars required military backing. After overpowering a Portuguese fort at Ambon in 1613, the Dutch faced a defiant competitor, which made a stand at West Timor. On May 30, 1619, Governor-General Jan Pieterszoon Coen led 19 ships on the Java Sea against Batavia, routed the Portuguese, and opened a new

beachhead overlooking trade routes. After murdering or expelling natives, Dutch planters exported cloves, mace, and nutmeg from the Banda Islands and expanded commerce with Asia, which profited from European technology. The Dutch penetrated Japanese commerce with trade at Dejima, in southern Japan. In 1640, the VOC added to its exports cinnamon from the fortified port of Galle, Ceylon (now Sri Lanka), also a source of areca nuts, cardamom, ginger, pepper, and exotic wood.

In 1652, colonial administrator Jan van Riebeeck, manager of the VOC post in Tonkin, Vietnam, opened a supply post at the Cape of Good Hope for vessels rounding South Africa on their way east. The Dutch firm hosted a treatment center for scurvy-weakened sailors. In 1658, soldier Gerard Pieterszen Hulft seized Colombo, in west-central Sri Lanka, and drove the Portuguese from southwestern India's Malabar Coast, where pepper plants grew wild. Commercial centers in Persia, Bengal, Macassar, Thailand, Canton, Taiwan, and Coromandel, India, extended Dutch income from its colonies in cocoa, coffee,

[Recipe: Dutch Spice Cookies](#)

Stir 5 ounces of soft butter until smooth. Mix in four eggs. Add 34 ounces of brown sugar and a pinch of salt. Mix thoroughly with 1/2 teaspoon of cardamom, 1/2 teaspoon of ginger powder, 1/2 teaspoon of ground anise, 1/2 teaspoon of ground clove, 1/2 teaspoon of ground nutmeg, and two 2 teaspoons of ground cinnamon. Sift in 38 ounces of flour and 1 tablespoon of baking powder. Knead the dough and refrigerate for two hours. Roll out dough until it is 1/4 inch thick. Cut out cookies. Brush with 5 tablespoons of beer and sprinkle with 6 ounces of coarse sugar. Bake at 400 degrees Fahrenheit for 20 minutes. Cool on a baker's rack.

macassar oil, mother of pearl, rattan, rice, and rubber. At its height in 1669, the VOC, the world's richest corporation, boasted 150 merchant ships, 40 warships, 50,000 clerks, 10,000 soldiers, and a 40 percent annual dividend.

The Dutch trading empire stumbled in 1670 during dynastic changes in China from Ming to Qing and because of an economic decline in Japan. The English

took advantage of regional upheaval to seize European pepper markets. After the publication of VOC Governor Hendrik van Rheede's 12-volume botanical encyclopedia *Hortus Indicus Malabaricus* (*A Malabar Indian Garden*, 1678–1703), Danish and French traders entered Europe in competition for the pepper and spice trade. In 1715, Indian potentates, seeking independence, renounced alliances with the Dutch. By 1721, the English had gained the upper hand with Indian traders and undermined Dutch control. To restore high profits, the VOC expanded its fleet and manpower by 125 percent and diversified products to include coffee, cotton, dyes, opium, seashells, sugar, tea, and textiles.

Poor management and dishonest employees, however, contributed to declines in income and profitability. Simultaneous with a drop in the sugar market in 1720, the Dutch lost control of trade in Bengal, Malabar, Persia, and Surat in northwestern India. After 1730, the unwieldy VOC distributed more dividends than it earned, filling the gap with disastrous short-term loans. Still attempting to support 25,000 dealers in ten Asian countries for a half century after 1750, the company foundered in 1799, when the Dutch crown took control and the English commandeered the pepper trade.

See also: British East India Company; Maritime Trade Routes; Peppers.

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Dye, Food

Dye heightens the visual appeal of food by intensifying natural colors. As civilization developed, food dyes achieved value in world trade.

From 2000 B.C.E., the extraction of the crocus stigma in Assyria yielded a brilliant yellow dye valued as an aphrodisiac, a mood elevator, and a tea and wine colorant. Alexander the Great ate saffron rice, drank saffron tea, and bathed in saffron water to heal combat wounds. At the outbreak of the Black Death in the fourteenth century, the fearful laced their food with costly saffron, which rose in price between the ports of Genoa, Rhodes, and Venice and destinations in the western Mediterranean. Saffron maintained a prominent place in food dye history. Spanish restaurants produced a lustrous yellow in paella. The French added saffron to bouillabaise; the Italians, to Milanese risotto. Pennsylvania Dutch cooks tinted their noodles and cake flour with saffron. In 2010, researchers found saffron beneficial in the treatment of Alzheimer's disease, macular degeneration, and retinitis pigmentosa.

A rival of saffron, Indian turmeric, grown in the tropics, colors curry and Sumatran *satay padang*, a skewered beef topped with a deep yellow sauce. The Japa nese of Okinawa prize turmeric tea. In the United States, turmeric heightens the tone of biscuits, chicken broth, dairy products, orange juice, pickles, popcorn, and yogurt. Current evaluation of medicinal value of the curcumin in turmeric suggests applications to Alzheimer's disease, arthritis, cancer, and pancreatitis.

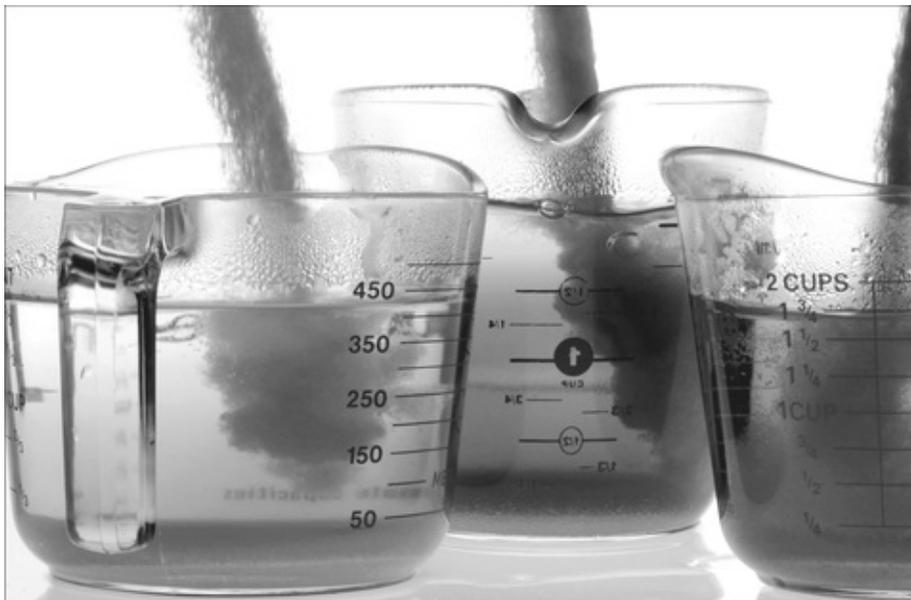
The Aztec and Maya profited from cochineal, a dye extracted from a scaly parasite living on opuntia cacti. Trading vessels carried the colorant to England, India, and Spain, where alchemists, clothiers, cooks, and painters paid top price for red pigments. In the mid-1800s, cochineal production expanded to the Canary Islands, Guatemala, North Africa, and Spain, where collection of 70,000 insects produced 1 pound (0.45 kilogram) of carmine dye. Cochineal lost value in the next century after the invention of alizarin crimson, an artificial dye. In 2005, the Canary Islands, Chile, Mexico, and Peru continued to ship carmine to top distributors of gelatin, marinades, and surimi in France, Italy, and Japan, but not to Islamic or Jewish consumers, who forbid the addition of insect-based dye to edibles.

A common dye in Filipino, Latin American, and West Indian cuisine, annatto

derived from the seeds of the achiote, a tropical tree native to South America. Aztec priests employed it in ritual and body painting and as ink for manuscripts. Recipes for achiote paste and *arroz con pollo* (chicken with rice) take their yellow hue from annatto. In London in 1860, the colorant brightened cheddar cheese and butter.

Modern Diversity

Employing the hues of alfalfa, algae, annatto, beets, blueberries, butterfly peas, caramelized sugar, carmine, carrots, cochineal, elderberries, grapes, mushrooms, pandanus, paprika, saffron, and turmeric, colorants boost the blander tints of bubble gum and candies, cheese, citrus fruit, jelly, pickles, sausage, vitamins, and wine. Pandanus tints and flavors rice pudding in Bangladesh, Burma, Indonesia, and Thailand; in Hungary and Spain, paprika, an antioxidant, gives a rust-red hue to rice-and-meat soups and stews. The carmine coloring of maraschino cherries from Scarlet GN (an artificial azo dye) satisfies consumers' expectations of a deep red, which they associate with intense aroma and flavor. Similarly, elderberry darkens St.-Germain liqueur in France and purple syrups and tisanes in Germany and Italy.



Natural and artificial food coloring has little or no effect on food taste but is essential to modern consumer

marketing. The manufacturer of Jell-O uses combinations of seven federally approved artificial dyes to color its gelatin fruit flavors. (MCT/ Getty Images)

Caramel concentrate, one of the most traditional and least suspect food dyes, provides a familiar brown hue in beer, bread, chocolate, fish, ice cream, potato chips, and soft drinks. Synthetic tinting with betanin from beet juice conceals variants in bacon and soups and restores lost intensity to oranges, salmon, and tomato pulp. Bakers choose vegetable dye as a means of coloring icing for drawing shapes, numbers, and letters on cakes and cookies.

For children, Gatorade, Hawaiian Punch, Kraft Mac and Cheese, Minute Maid Lemonade, Pop-Tarts, Skittles, and Velveeta display the Crayola colors that grab attention. The dyeing of grain cereal into colorful children's breakfast cereals adds fun to scooping up floating bits from milk. In the 1970s, however, pediatrician Ben Feingold of California treated inattention and hyperactivity in young patients by ridding the diet of artificial colors and flavors. His findings set the scientific community in search of harmful additives.

Imitators

Suspect among food dyes, azo dyes trigger asthma, edema, and hives as well as bladder cancer and cardiac arrhythmias. In 1976, the U.S. Food and Drug Administration (FDA) banned an artificial dye known as Amaranth—the infamous Red Dye No. 2—a reddish purple coloring linked to malignancies. The deep hue had previously tinted chocolate pudding, hot dogs, grape soda, and gravy mix. General Foods, the last to halt Amaranth usage, reformulated Gaines dog food, Jell-O, and Kool-Aid. Food processors protested that rats grew cancers only after being force-fed large amounts of the dye.

As new colorants burst on the scene after 2005, making food more kid-friendly, a replacement hue, Allura Red AC, the colorant of red cotton candy, Gummy Bears, medications, and strawberry beverages, appeared to target children's diet. Along with Azorubine, Ponceau 4R, and Red 2G, additional red dyes, the Allura shade came under scrutiny in England with a 2007 University of Southampton study of lowering IQs in children and increasing hyperactivity and anomalies in bladder, bone marrow, colon, and stomach. British food producers began a two-

year phase-out of the dye. Allura maintained its presence in U.S. foods, but the United States, Canada, Japan, Norway, and Sweden banned Azorubine.

The illicit use of synthetic dyes, such as the carcinogen Sudan 1 in chili and paprika in England in 2003, require constant monitoring in international markets. A broad ruling in Norway governing such artificial dyes as Brilliant Black BN, Brown HT, Fast Yellow AB, Lithol Rubine BK, Orange B, Para Red, Sunset Yellow, and Yellow 2G raises issues of allergies and attention deficit disorder in consumers. Among the most suspect, tartrazine, a yellow shade also used in green tints, may negatively affect hepatic and renal function, inflame gastric linings, lower sperm count, and alter behavior in children from the effects of sodium benzoate.

On June 30, 2010, Michael Jacobson, director of the Center for Science in the Public Interest in Washington, D.C., recommended banning tartrazine for its disruption of children's behavior and for possibly causing cancer. He backed his statement by insisting that such dyes serve no health purpose and may contain neurotoxins. Manufacturers showed interest in returning to natural dyes—beet juice, carrots, pumpkin, strawberries, and turmeric—but recognized that they might spend more money and achieve a less stable product.

After decades of assurance to the public that food dye is safe, the FDA in March 2011 signaled its willingness to re-examine evidence of behavior and health problems. A new panel began considering warning labels indicating that the nine artificial dyes approved for food processing cause cancer and exacerbate hyperactivity. Taking the opposite stance, the Grocery Manufacturers Association sided with artificial food dye makers in demanding clinical proof of harm. Kraft Foods took a cautious approach by introducing color-free Capri Sun juices, Kool-Aid Invisible, and Macaroni and Cheese Organic White Cheddar. A stronger approach from Trader Joe's and Whole Foods Markets involves the refusal to stock foods that are artificially colored.

See also: Additives, Food; Australian Food Trade; Blueberries; Sanitation.

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Ecofeminism

A woman-centered ecological crusade for the common good, ecofeminism nurtures fragile life-forms and promotes stewardship of Earth's flora and fauna. In the name of the meta phoric Earth Mother, conservationists celebrate feminine instincts for reverence and protection of resources, especially food and water. Since the Industrial Revolution unleashed social havoc and accelerated the destruction of nature, the reciprocity of feminine sensibility has benefited families inundated by commercial profiteering.

One utopian fantasy, Charlotte Perkins Gilman's *Herland* (1915), set female vegetarians in a self-sustaining organic haven. Of the equality of their mission, she stated, "Neither did they start off on predatory excursions to get more land from somebody else, or to get more food from somebody else." Instead, 3 million farmers established and tended fruit and nut orchards and replenished the land with recycled green waste. The novel established common ground for ecofeminists by saluting female Earth keepers from prehistory.

Ecocritical idealists Marjorie Kinnan Rawlings, Sarah Orne Jewett, Barbara Kingsolver, and Willa Cather issued social and political truths that charged squanderers and polluters with befouling Earth's fecundity and bounty. Reclaiming ancient food wisdom, sci-fi author Ursula K. Le Guin's *Earthsea* sextet dramatized eating styles close to the source and the drying, smoking, and salting that preserved surpluses before the industrialization of food. In a glimpse of twentieth-century predations, Laguna Pueblo novelist Leslie Marmon Silko's diatribe *Almanac of the Dead* (1991) charged patriarchal governments with funding weapons and death while ignoring the homeless and hungry. Her clan witnessed skewed U.S. values on July 16, 1945, when an atomic blast outside the Los Alamos, New Mexico, laboratory obliterated apricot orchards and melon gardens and permeated groundwater with toxic radioactive rubble. She labeled the profanation of Earth an extreme example of white man's folly.

In *Yellow Woman and a Beauty of the Spirit* (1996), Silko acknowledged the planetary life network by asserting that “None can survive unless all survive.” Through the character Wilson Weasel Tail, she projected a rebirth of the buffalo, the Lakota equivalent of heavenly manna. In her edenic novel *Gardens in the Dunes* (1999), she pictured the altruism of the Sand Lizard tribe, a female clan of hunter-gatherers who modeled stewardship and frugality as well as the sharing with the needy of piñon nut flour, cattail roots, palm dates, sprouted seeds, and wild gourd vines.

At the core of ecofeminism lie issues of globalism and whole Earth conservation. In 1998, essayist Marilynne Robinson alerted readers to the shrinking habitats of whales and to the eventual despoliation of the sea as a source of food, a disaster of unfathomable proportions. In New Delhi, India, philosopher Vandana Shiva began a national movement in the 1990s to reverse destruction by empowering women in the green movements in Africa, Asia, Europe, and Latin America. Her projects emphasize native seed and organic food growing as bases of human well-being.

See also: Genetically Modified Food; Local Food Movement.

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[Egyptian Diet and Cuisine, Ancient](#)

Diet and meal service in pharaonic Egypt demanded planning and order that set

patterns of social class. Egyptian royalty believed that food made the nation content: By filling the people's bellies, the pharaoh kept anarchy and revolt under control. From around 3100 to 30 B.C.E., peasants, who made up 95 percent of the population of some 3 million Egyptians, maintained one of the highest standards of living in the region. At the banks of the Nile River, they obtained fish and the water to irrigate barley, emmer wheat, and flax fields—the source of beer, bread, oil, and seed. If farmers and their families acquired a surplus, they sold it for cash to buy other goods. They also produced a liquid power food called *bouza* (beer) by crushing bread in water and fermenting the mash in large resin-lined jars. Bouza so anchored the cuisine that children carried skins of beer to school for lunch.

Bureaucratic records from around 2400 B.C.E. revealed the importance of the food distribution system in considerable detail. After the annual June flood of melted snow from the Ethiopian highlands, planting in alluvial mud involved broadcasting by hand and treading seed into the soil by goats and sheep and channeling water through canals from the river by *shaduf*, a counter weighted dip bucket on a long pole. During unending toil, which included pulling plows in lieu of draft animals, men drank from leather water flasks and hung them in the shade to cool. Constant vigilance against crocodiles and hippopotamuses protected plants from trampling and workers from attack. After 2100 B.C.E., Egyptians chanted a praise anthem to the Nile for maintaining nature's balance and for making farmers self-sufficient.

On the threshing floor at harvest time in April and May, winnowers drove cattle, donkeys, oxen, and sheep over grain shafts to separate kernels from husks. Tax collectors recorded the yield and apportioned the amount the farmer owed the pharaoh. During a poor season, a diet of lily loaves, papyrus pith, and roasted lotus bulb bread contributed to malnutrition in peasants. A high yield supported nobles and the artisanal class, who developed high standards of accounting, canal engineering, charioteering, medicine and midwifery, pottery, toolmaking, and weaving. During the imperial age, from 1539 to 1075 B.C.E., the demand for crushed grain for porridge or flat cakes rose so high in Nubia and the Fertile Crescent in western Asia that Egyptian farmers had no spare forage for raising domesticated cattle and geese. In the tenth century B.C.E., however, the book of Exodus characterized Egypt as the best place for starving nations to seek relief.

Rome, the major grain purchaser, depended on Egyptian harvests to stave off mass famine.

The Average Egyptian

Archaeologists have deduced from digs at Amarna, Deir el-Medina, and Kahun that most Egyptian families possessed simple clay oil jugs, limestone mortars, rush baskets, and saddle querns for kitchen chores and salt bins for preserving carp, catfish, eel, mullet, and perch. The poor grew *ben* nut (moringa) trees along the riverbanks to crush for cooking oil and also rendered castor oil from *kiki*, a medicinal herb.

Daily meal preparation required intense grinding of sun-toasted grain on hand mills and the removal of chaff as well as insects and rocks with rush sieves. Stems and hulls went into animal feed or the molding of fibrous mud brick. Bread making concluded with kneading flour with water, salt, and leaven or sourdough starter in dough vats, a process invented at Memphis. Cooks baked dough in hot sand, on hearth slabs, or on shelves in earthen ovens heated at bottom with charcoal, dung, or wood.

Enlivening a grain-based diet over time, Egyptians revered garlic, leeks, and onions, all varieties of the sacred *Allium* family. Additional flavor and nutrition derived from broad beans and cowpeas, cabbage, chicory, cucumber, lentils, melon, *Raphanus* (wild radish), romaine, spinach, and turnips. Laborers also grew herbs in home gardens as both food and medicine, which the Egyptians honored as the “necessary art.” Couples used a kitchen recipe of honey, milk and cream, and “red salt” (natron or sodium) on fiber as a contraceptive and blended beer, dates, frankincense, and oil to encourage childbearing. The concept of treating *similia similibus* (like with like) caused doctors to prescribe ostrich egg to a patient suffering a cranial fracture, a worm-shaped carob fruit as a vermifuge, and the milky juice of lettuce to promote fertility.

Dining areas featured occasional tables, where people knelt to eat without utensils from flat baskets and to drink from cups. Air filtration through woven mats suspended over doors and windows kept flying insects out of food. Light came from twists of burning plant fiber permeated with sesame oil. The serving

of wheat cakes with honey and the pulp of dates, figs, and grapes rounded out a meal.

Respect for the dead dictated many practices. Mourners abstained from food until the post-funeral banquet. Loaves accompanied the deceased to their tombs, such as the barley loaves left at Sakkarah, the necropolis at Memphis, around 3475 B.C.E. to honor a noblewoman. Funerary cults listed a wide range of appropriate nourishment—16 types of bread and pastry, 11 fruit varieties, ten meat entrées, six types of wine, five species of poultry, and four types of beer. They avoided fish because of its odor.

A hieroglyphic list from after 2600 B.C.E. at Dahshur, south of Cairo, pictured uniformed handmaidens delivering appropriate grave foods to the dead on trays. A menu inscribed on the tomb wall reminded servants in the afterlife of the favorite foods of the deceased. Exactly 40 days after the funeral, survivors brought provisions to the cemetery and distributed them to the poor, a gesture accruing goodwill from judges in the underworld. Food left at the site drew jackals and wolves, giving rise to the myth that the animals guarded burial sites.

Marketing, Barter, and Theft

Farmers reserved lentils, lotus seed, and *Raphanus* oil for market, which they reached by camel or donkey. In good years, commerce moved briskly along the Nile River delta. In bad years, low flooding silted in branches leading from the capital at Memphis to the Mediterranean Sea, impeding transport of produce to buyers. During famines, laborers and quarriers became the first to suffer malnutrition or starvation. To limit the loss to the labor pool, the state operated grain silos and reservoirs that stored surpluses for times of dearth and allotted handouts in standard amounts. At public kitchens, the needy and homeless used tall mortars and poles for pounding and communal mills for cleaning hulled grain.

Wages tended to take the form of beer, bread loaves, grain, oil, or vegetables rather than coins. To ensure rapid work on the three pyramids at Giza, one of the Seven Wonders of the Ancient World, between 2575 and 2465 B.C.E., overseers employed by the pharaoh Khufu and his successors appear to have fed laborers

beef. Soldiers received plaster ration tokens in the shape of a cylindrical, oval, or round loaf for presentation at the supply depot, which also distributed salt fish. Sailors earned a similar bread dole that equaled half the amount apportioned to the captain, first mate, and ship's watch.

Exotic trade goods, especially coconuts, mandrake, and olives, set the wealthy apart from peasants and drones. Professional hunters killed cranes, herons, and pelicans with throwing sticks or arrows and netted small birds and pintail ducks for sale. The rich adorned their tables with glass chalices for wine and with servings of red meat, which included pork in the delta region and, at Memphis, gazelles, oryxes, and ostriches, big game stalked by pharaohs and courtiers. The tomb art honoring the grain accountant Nebamun around 1500 B.C.E. pictured him wielding a serpentine throwing stick at marshland birds and waterfowl and dining in luxury. Privileged artisans and temple priests received meat portions on holidays and game birds from successful hunts.

Refined Dining

Crouched at floor level over bronze, copper, and terra-cotta cookware, chefs prepared food in the open air of a courtyard or flat roof, flavoring recipes for mullet roe cake and spit-roasted geese and pigeon with coriander, cumin, dill, lettuce and mustard seed, marjoram, mint, and vinegar. The palace of Thutmose IV (r. ca. 1512–ca. 1504 B.C.E.) produced an innovation: a separate kitchen streamlined with three ovens and an in-floor cistern, plus storage amphorae accessed from openings in the bottoms dispensing condiments, grain, legumes, and spices.

Skilled chefs added mallow to soup, tigernuts to cake, fish roe to pickles, and carob, grape and plum must, honey, jujube, knotgrass, lotus, *seneb* berries, and wine to marinades. They omitted fish from the menu as an unclean creature suited to consumption by the lower class. In a hot climate, milk required immediate use or processing into butter or sour cream. Ceremonial bread, a high-gluten specialty, rose in conical or cylindrical molds. Because the baker broke the mold to extract the loaves, the bread making generated exorbitant costs.

Seating on carved chairs and food service on bronze, gold, or silver dishes

contrasted with the lowly huts and clay tableware of the poor. To enhance the palatial atmosphere, stewards employed *kyphi*, an air freshener and lung-purifying drink blended from cassia, cedar, cinnamon, honey, juniper berries, raisins, resins, sedge, spikenard, and wine. A more complex recipe from Edfu Temple mentions cardamom, mint, pine kernels, and saffron. Before the distribution of entrées, maidservants rinsed the hands of guests. Butlers strained wine through metal strainers into goblets and passed them to wine tasters to sample the vintage. Flatbread with hollows in the center served as bowls for beans and vegetables.

Diners lifted bites of raw songbirds or quail or roasted waterfowl with the thumb and first two fingers, an affectation of the elegant. They dipped lettuce in salted oil or goose fat and dabbled their soiled fingertips in bowls of scented water. Dessert might consist of fried sweet pancakes or sweet rolls, made by stuffing dried fruit into dough. As a digestive, diners sipped diluted cumin crushed in water.

Mustard water combated more debilitating illnesses, such as fainting or seizures. The bitter cucumber (also known as wild gourd) purged the bowels and aborted pregnancies. Autopsies of mummies recognized the value of curative foods, but questioned the Egyptian diet for encouraging heart disease, obesity, and tooth decay.

The Developing Cuisine

Egyptian cuisine acquired new flavors and textures from imports, particularly apples, juniper berries, olives, and pomegranates. Because attempts at establishing olive groves in Alexandria and the Faiyum had mixed success, Egypt proved a steady customer for Greek olive oil. The Nuer, a pastoral tribe of southern Sudan, introduced cattle. Thutmose III (r. ca. 1504–1450 B.C.E.) brought chickens from Syria, the culture that also refined bee and wine fermentation. From Persia, the Egyptians acquired mulberries and pomegranates. From the Romans, the pharaoh's gardeners acquired almonds, cherries, citrus fruit, peaches, and pears and, as early as 1400 B.C.E., learned the art of espaliering branches along garden walls. To the south, Nubians bartered with millet and

sorghum; Libya and Ethiopia provided dried lake salt. Fenugreek, used as a pickling spice and brewed to make tea, and pepper apparently reached Egypt from India or the Fertile Crescent. For oil, the Egyptians pressed almonds, *ben* nuts, cole seed, linseed, *Raphanus*, safflower, and sesame. The upper class enjoyed a highly intoxicating fig wine as well as date and pomegranate vintages, but like the Greeks and Romans, repudiated public drunkenness as boorish.

Special prayers and ritual sprinklings accompanied the temple slaughter of calves and oxen. Priests revered the liver and spleen and preserved bloody runoff for blood sausage. They either cast the animal head into the river or sold it to impious Greeks. In 1350 B.C.E., Egypt's first monotheist, Akhenaten (also called Amenhotep IV), the husband of Nefertiti and father of Tutankhamen, began closing temples and seizing sacred property as a means of enforcing Atenism, his radical religious reform. The loss of sacred plantations and the swine herds of Abydos threatened the nation with economic collapse.

Around 1175 B.C.E., Ramses III endowed a large dole of beer, bread, cattle, dried dates, garlic, geese, raisins, waterfowl, and wheat for artisans, priests, and tomb builders at Heliopolis, Memphis, and Thebes. Five years later, during attacks by the Sea Peoples (a confederacy of seafaring raiders), the loss of the pharaoh's food allotment resulted in a labor strike at the necropolis at Deir el-Medina, the first employee walkout in history. Ramses's viziers restored the barley and wheat supply and cajoled palace artisans to resume work on royal tombs.

Under Ramses IV (r. 1151– 1145 B.C.E.), the provisioning of Deir el-Medina grew more erratic, provoking a backlash of tomb robberies and six decades of governmental instability. The cost of palace cuisine reached a pinnacle under Ramses IV, who led a royal quarry expedition of 9,368 people. His household required the specialties of confectioners and pastry chefs, bakers and brewers, butchers, meat managers, and sommeliers.

See also: Bread; Emmer Wheat; Espaliering; Irrigation; Maritime Trade Routes; Poultry; Shellfish; Trade Routes; Trading Vessels; Yeast.

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Einkorn Wheat

From the Mediterranean shores to the northern coniferous forests, einkorn (*Triticum monococcum*), or single-grain, wheat flourished as one of the first domesticated crops cultivated in the Middle East. The seed of einkorn wheat—the name “einkorn” comes from the German for “one seed”— is a pale red kernel naturally carapaced against disease and insect infestation.

The sturdy-hulled wheat, which is the domestic version of wild wheat (*Triticum boeoticum*), contributed to the domestication of hunter-gatherers in the western end of the Fertile Crescent in western Asia. During the Neolithic revolution around 12,000 B.C.E., einkorn’s large seeds found a place at campfires as sources of digestible roasted grains. Pouches of charred or roasted einkorn bore an aromatic, flavorful, and stable travel food easily carried and eaten without further cooking.

After the settlement of Mureybit and Abu Hureyra east of Aleppo in western Mesopotamia (in present-day Syria) in 11,050 B.C.E., a millennium of drought forced the Natufians, the earliest settled people of Palestine, to adopt agrarianism by caching grain in storage pits to stave off famine. To cultivate wild seeds, Natufian settlers fenced in fields and broadcast seeds in open spots near fruit trees and berry patches. Because of the ease of harvesting wild stands growing 3 feet (1 meter) tall, a family could amass a year’s supply of grain from three weeks’ work. As a result of clan clustering around the wettest, most productive fields, population density rose from 1 to 15 people per square mile (3 to 39 people per square kilometer).



Einkorn wheat, a protein-rich wild species native to the Middle East, was one of the first grain crops domesticated by humans. Paleobotanists have found evidence of cultivation in the Fertile Crescent some 12,000 years ago. (*David Q. Cabagnaro/Getty Images*)

To feed all, protofarmers across the east-west axis of Eurasia domesticated eight self-pollinating, early-maturing founder crops, which featured einkorn wheat. The choice favored a variety resistant to fungus and frost. The use of hulled wheat as food required the tools of grain preparation—sickles for harvesting, grinding stones for removal of chaff from tightly wrapped kernels, and mortars hammered out of bedrock for refining grain into a fine yellow flour.

Low-yielding but protein-rich, einkorn wheat provided low-fiber gruel suitable for nurturing invalids and weaning babies. The variety failed at loaf making because of its poor rising capability; however, it may have been the basis of the first beer.

Wheat in Early Civilization

Paleobotanists studying food sources in Mycenae (present-day mainland Greece), Sumer, in Mesopotamia (present-day Iraq), and Troy (northwestern Turkey) have concluded that domesticated wheat varieties flourished in a single latitude from about 10,500 B.C.E. and contributed to the baking styles that undergirded urbanization. Baking flatbread consisted of hand-crushing grains, adding water, and spreading the mix on a heated stone. A covering of hot ashes finished the cooking process. The Sumerians became the first ancient peoples to mix naturally yeasting sourdough with an unleavened mass to form risen loaves.

Cultivation in Jordan and Turkey spread across the Balkans to Serbia, the Danube delta, and the mouth of the Rhine; as far west as northern Italy and Valencia, Spain; and north to Denmark and Britain. Einkorn grew in North Africa, but not in the hotter climates to the south in Ethiopia and southern Egypt or in the irrigated fields of Mesopotamia.

In about 9000 B.C.E., the planting and harvesting of wild einkorn, a more productive cereal grain than its cousin, emmer wheat, introduced wheat cultivation in southeastern Turkey. Harvested in Jericho in 8000 B.C.E., in Cyprus, the Indus Valley where the Harappan culture thrived, and Kurdistan in 7000 B.C.E., and in Argissa, Greece, and Crete in 6000 B.C.E., einkorn shared growing space with emmer wheat and barley, forming a triad of founder crops that flourished in clay and marl soils.

With the addition of salt, einkorn formed an inelastic dough that required no kneading and a short baking time. The survival of massive grindstones indicates the production of bulk wheat flour. The growing of einkorn reached the northern Greek peninsula—to Macedonia, Thessaly, and Thrace—after 5200 B.C.E. and the Bug and Dniester valleys of Russia about 4500 B.C.E. The 1991 recovery in the Italian Alps of Ötzi the Iceman, Europe's most ancient mummy, established the use of einkorn bread in 3300 B.C.E. on the mountainous ridge separating present-day Austria and Switzerland.

Classical and Modern Grains

In Bronze Age Greece, mythology about Demeter, the goddess of cereal grains, depicted her charging Triptolemus, a chief of Eleusis, with sowing seeds to feed humankind. Homer's *Odyssey* (ca. 800 B.C.E.) referred to einkorn wheat as *zeia*, a term indicating one-seeded wheat. A standard rural meal among northern pastoral people involved the boiling of einkorn flour at the hearth with salt or *siraion* (wine must) and either milk or water to produce sweetened porridge. Meals concluded with cups of plain or honeyed wine.

According to Hippocrates's *Regimen II* (ca. 400 B.C.E.), Greek cooks traditionally formed ground wheat into unleavened cakes that they baked in an oven and drizzled with honey. More elaborate recipes for *diepnon* (the main or evening meal) called for frying wheat batter into drop biscuits or pancakes, baking dough in crockery or under ash, or stirring wheat in an urn to make sweetened *maza* (porridge), the main Greek dish. Diners rounded out meals simply with dates, figs, grapes, nuts, and wine.

During the Roman monarchy from 753 to 508 B.C.E. the pastoral community made a simple porridge from einkorn flour, water, and salt. By the time of the republic, Romans formed 75 percent of their daily diet around einkorn, either ground or pounded on a saddle quern for simmering into gruel. Although preparers sieved the flour through cloth or wickerwork, the remaining stone grit in wheat recipes compromised the enamel of teeth. Nonetheless, the devout revered the grain for funeral meals and grave gifts.

More sophisticated cuisine replaced traditional cookery after 300 B.C.E., when Greek kitchen styles influenced Roman cooks. To punish disobedient soldiers in the early third century B.C.E., according to historians Livy and Plutarch, officers replaced wheat rations with barley, a crude grain associated with pack animals, poor peasants, and slaves. Professional milling and baking, an urban necessity for patrician Romans, began around 174 B.C.E. Around 150 B.C.E., Cato the Censor advised cooks on the art of gruel making—wash and husk the wheat and rinse thoroughly. After the initial cooking, Cato explained the gradual liquefying of the mush by adding milk.

As legionary power encroached around the Mediterranean, central Italian food styles influenced less cosmopolitan areas. For grain meals in the second century C.E., Galen, a Turco-Roman physician, valued einkorn more than oats, which he considered famine food for its low nutrition. In Anatolia in western Turkey,

conquered peoples paid their tax assessment to Rome in einkorn grain and sold surpluses to feed Roman soldiers and their mounts. At Pergamum in western Anatolia, einkorn served communities as a source of low-grade flour.

After 27 B.C.E., the first years of the Roman empire saw a shift from hard-hulled wheat to free-threshing varieties of bread wheat to grace Roman tables with pastry and white bread. After the Roman occupation of Britain in 43 C.E., provisioners may have parched wheat in grain-drying kilns to simplify threshing and chaff removal. In the 700s C.E., einkorn became the main Anglo-Saxon cereal crop. Slowly, Britain's agrarian traditions shifted toward bread wheat, in part because of culinary habit and resistance to agricultural innovation.

As new varieties of wheat evolved, farmers abandoned einkorn in favor of easier milled hull-less grain. During the Industrial Revolution (starting in Britain in the late eighteenth century), cooks favored softer wheat varieties that gave bread and pastries more elasticity and a less fibrous crumb.

The health-conscious twenty-first-century baker rediscovered artisanal breads from ancient grains and returned highly digestible einkorn wheat to popularity. Cake, pita bread, and pasta made from einkorn wheat appears to suit the gluten-free diet of victims of celiac sprue, an autoimmune ailment of the small intestine. Nutritionists laud einkorn wheat for its low toxicity and for containing antioxidants, beta-carotene, lutein, phosphorus potassium, riboflavin, and vitamin A.

Still grown in the Kurdish uplands from Anatolia through the Zagros Mountains in Iran, einkorn is used for animal feed, bedding and thatching, and materials for basketry. In the kitchen, bulgur (parboiled and husked wheat) appears in recipes for baked goods, *kibbeh* (meat-stuffed croquettes), pilau (pilaf), soup, stuffing, and tabbouleh, a salad of cooked grain mixed with mint, onion, parsley, and tomato and seasoned with vinaigrette.

See also: Agriculture; Emmer Wheat; Hybridization; Paleolithic Diet; Theophrastus.

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[Eliot, Jared \(1685-1763\)](#)

Agronomist Jared Eliot, the first clerical physician in the colony of Connecticut, compiled the first North American guide to intensive horticulture, which defined farm wealth as a means of strengthening the colonies.

The third in a lineage of public-spirited New England farmers, Eliot grew up in Guilford. He studied books on farming that he inherited from his grandfather and, in 1706, completed his studies at Yale College. With a master's degree from Harvard College in 1709, he entered the ministry at the Congregational church in Killingworth, Connecticut.

Networking with agrarians in Boston, London, New Haven, and Philadelphia, he encouraged pragmatic enlightenment that bolstered a market economy. In 1747, he published "Essay upon Field Husbandry" in the *New York Gazette*, which published three subsequent essays by Eliot in 1753 and a fifth essay in 1754. A Boston printer issued a compendium of Eliot's essays in 1761 that aroused enthusiasm for generating greater wheat yields.

With the exegetical style and tone of a pulpit preacher, Eliot introduced uses for the American black cherry and devised a way to turn a hilltop well into a hillside spring. He described the soaking of corn kernels in water to improve digestion and a similar soaking of corn with oats to fatten horses. At age 62, he shifted his focus from physical maladies to experimental agriculture and the breeding of a sturdier strain of sheep. Because of widespread soil depletion in New England, he recommended the drainage of swamps to flood farmland with nutrient-rich sludge. The introduction of calcareous sand from a Guilford beach provided much-needed lime; dry ash boosted the production of corn. He recommended the planting of red clover and timothy for the sake of the soil and

the health of herd animals and advocated the cultivation of cabbage, corn, flax, hemp, kale, and turnips. He imported Russian watermelon seed from Archangel and reported a first harvest of melons weighing more than 15 pounds (6.8 kilograms).

The looming conflict with Georgian England turned Eliot's attention to pragmatic agrarian problems that kept colonists dependent on transatlantic trade and imports from the West Indies. After the English prohibited the importation of molasses and sugar from the West Indies, he proposed turning apple cider into molasses. During a wheat shortage in 1747, he suggested grinding a half peck (4.4 liters) of white beans with a bushel (17.6 liters) of rye to make imitation wheat flour for bread.

His planting instructions valued intercropping oats with summer rye, barley with wheat, and oats with peas, which vined up the grain shaft, making double use of a single furrow. He foresaw the improvement of varied species of grain to spread wheat growing into the frontier and the planting of potatoes as ways to increase food crops. All such innovations aimed at alleviating a colonial "diet mean and coarse."

After publishing the first essay, Eliot continued exchanging farming advice with John Adams and Benjamin Franklin in Philadelphia and farmers in Europe. According to his second essay, a shortage of corn, which farmers shipped from Connecticut, resulted in weak dray animals. Eliot deduced that greater use of alfalfa, clover, and sainfoin in meadows would alleviate the dearth of forage for oxen. By turning sheep and swine into harvested fields, the animals would fatten while scavenging cornstalks and, simultaneously, trample their dung into the soil to fertilize the next year's crops. In a region short on manure, he listed ways of recycling ash, creek mud, fertilizer, hair, horn shavings, kelp, and rags, all of which avoided the "filth and nastiness" of dung as well as its load of weed seeds. His third essay proposed crop diversification to increase food variety, a means of limiting colonial dependence on imports from the mother country.

The fourth essay, issued in 1751, introduced the Norfolk system, which replaced fallowing with a four-crop rotation that included clover and turnips. He also enriched his fields with mulched leaves, nitrous sea salt, seaweed, and swamp dredgings. In the fifth essay, Eliot Americanized British inventor Jethro Tull's theories of tillage and contour plowing and promoted his own device to

drill turnip and wheat seed directly into furrows. Benjamin Franklin wrote a letter to Eliot in 1753 praising his commentary on Barbary barley, a significant beer and bread grain in world diets.

Eliot's sixth essay, composed in 1759 during the onset of war in Quebec, turned to problems of farm labor drafted into the Continental Army. Eliot proposed that the remaining farmers halt experiments in food cultivation and put their energies toward the establishment of fruit and nut trees and the growth of mulberry trees to foster the silk industry.

Eliot extolled the colonies for their contributions to food exports, particularly rice from the Carolinas, apples from New England, and fish from coastal sources. He described trade relations with the "British Sugar Islands" as circular, a reciprocal arrangement that enhanced the colonial table while enriching settlers from sale of cash crops. He enumerated ways of putting food plants into full use, such as harvesting berries for wine, fodder for poultry and swine, and ships' timbers from mulberry stands. His expansive views honored New England husbandry as a means of avoiding slavery and uniting farmers in a soil-based patriotism. By 1850, Eliot's methods were common practice throughout New England.

See also: Tull, Jethro.

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Emmer Wheat

One of the first domesticated crops planted in the Middle East, emmer wheat (*Triticum dicoccum*) derived from a wild cereal grain native to the western end of the Fertile Crescent in western Asia. A hardy but low-yielding grain resistant to fungus and salty soil, it flourished at uniform height in damp and rocky soils in both spring and winter, producing the first viable agrarian economy.

The emerging staff of life in northern Iran, emmer wheat appears to be a cross between wild einkorn wheat (*Triticum monococcum*) and wild goat grass (*Aegilops taus— chii*), an ancestor of bread wheat. Endowed with large, abundant grains, emmer wheat was the most nutritious and palatable grain and the easiest to harvest in prehistory. According to ethnobotanical studies, the species fed the Assyrians, Babylonians, and Egyptians at 80 percent of excavated sites.

Now called farro, emmer wheat serves brewers as a basis for beer and cooks as a source of high-fiber bread and a thickener for soup. Its chewy texture and nutty flavor satisfy hunger and introduce dietary fiber while supplying calcium, iron, magnesium, protein, and vitamins A and C.

Earliest Evidence

The earliest proof of emmer consumption was found at an archaeological dig in the Rift Valley of Israel, where seeds of the self-sowing hulled wheat surrounded a grinding stone in the late Paleolithic Age around 17,000 B.C.E. The grain required hulling and milling to prepare it for kitchen uses. In the Neolithic era, after the settlement of Abu Hureyra in western Mesopotamia (Syria) in 11,050 B.C.E., a millennium of drought forced inhabitants to cultivate wild seeds. As a result of clan clustering around the wettest, most productive fields, population density rose from 1 to 15 people per square mile (3 to 39 people per square kilometer). To feed all, protofarmers domesticated eight self-pollinating, early-maturing founder crops, which featured emmer wheat.

Dating to 9800 B.C.E., emmer grew wild in Israel and on the West Bank of the Jordan River valley. In the Euphrates-Tigris basin, emmer wheat planting in Sanliurfa, Turkey, appears to have begun around 9000 B.C.E. Using only digging

sticks and flint sickles, which cut stalks with a single stroke, from 8000 B.C.E., a head of house hold could feed a family on the proceeds of less than 5 acres (2 hectares) of land. Cropped stalks remained standing for grazing. Additional cropland provided seed for the next season's planting and for use as animal feed.

From 7700 B.C.E., when emmer flourished at Damascus, Syria, agrarianism rapidly replaced the more rigorous and risky hunter-gathering lifestyle. Sumerians achieved a 40 percent surplus of grain for brewing eight varieties of emmer beers. In Babylonia and at Mehargarh, India, farmers planted emmer wheat as early as 7000 B.C.E.; grain crops appeared in Greece in 6800 B.C.E. and in Crete and Germany in 6000 B.C.E. Beginning in 3400 B.C.E., northeastern Europeans managed a tripartite grain cultivation of barley and einkorn and emmer wheat. From 3150 B.C.E., predynastic Egyptians at Faiyum, El Omari, and Merimbole beni Salame valued emmer wheat for the era's staple fare of beer and sourdough bread, which they learned to make from Sumerian natural yeasting recipes.

Egypt, Rome, and Beyond

Throughout the classical period, the grain remained a primary crop. Long after the decline of emmer wheat cultivation in the Near East, Egyptian dealers traded surplus grain to Canaan, Mesopotamia, Nubia, and Syria. Their bakers experimented with yeast bread and produced lighter, fluffier wheat loaves, which the Greeks and Romans emulated. Emmer grain earned the name the "Pharaoh's wheat" for its storage in pyramids in bulk form and for funerary loaves shaped like animals.

In the book of Exodus, set around 1250 B.C.E., Pharaoh Rameses II placed the Hebrew Joseph, the vizier of Egypt, in charge of granaries of emmer wheat. On the walls of the tomb of Ramses III, artists depicted the rigors of bread making, which included pounding grain heads with sticks and milling on a saddle quern before baking loaves in portable clay bake ovens and in open-topped brick ovens. Emmer wheat dominated Egyptian cuisine until the arrival of durum wheat with the troops of Alexander the Great in 332 B.C.E.

Subsequent cultivation of a wider variety of grains around the Mediterranean

Sea did not exclude emmer wheat, which the Phoenicians raised at Volubilis, Morocco, as did the Jews in Israel. In Mesopotamia, the spe

Recipe: Roman Wheat Cakes

Marcus Porcius Cato's *De Agricultura* (*On Agriculture*, ca. 160 B.C.E.) recorded references to two types of unleavened wheat cake. For a large cheese-based *placenta* (cake), his ingredient list specified 2 pounds of soaked *alica* (emmer groats), 4.5 pounds of fine honey, 6 pounds of spelt flour, and 14 pounds of fresh sheep's cheese.

The baker kneaded groats and flour in a mortar and shaped the mass into pastry strips. The dough dried in a wicker basket before a brushing with oil. The cheese required washing and draining three times and breaking in a mortar, before the cook passed the curds through a sieve. Shaping of the *placenta* began with wrapping flour strips and layers of cheese and honey. The cook shaped the cake on oiled bay leaves and covered it with the remaining flour strips. The cake baked slowly on a hot hearth under a clay pot covered with hot embers. Presentation followed spreading the top with honey.

A simpler *libum* (hard flat cake) required 1 pound of emmer flour, 1 egg, and 2 pounds of cheese. The baker kneaded the ingredients and placed the mass on bay leaves to bake slowly on a hot hearth under a clay pot. After pre sen tat ion at Jupiter's altar for sacred offerings, the cakes became the property of priests.

cies remained dominant until 3000 B.C.E., when barley advanced to the prime cereal crop. Around 800 B.C.E., Homer described fertile grain fields as "emmer-bearing."

Julius Caesar's forces appear to have introduced the hearty cereal to Italy after the Roman invasion of Egypt in 30 B.C.E. As the basis for *farina* flour, emmer wheat became the source of the gruel that dominated Roman cuisine. Because Rome's metropolis depended on grain imports from Egypt, Roman agronomists experimented at growing wheat varieties along the Nile.

Numa, Rome's second king, introduced an annual harvest thanksgiving called the Feast of the Ovens, during which worshippers roasted emmer groats as a sacred gift. For three centuries, the Romans ate only emmer cereal. As a token of the hearth and nourishment of the family, nuptial couples ate farro as part of a *confarreatio* (wedding) and the *confarati*, shared marriage vows.

In *Historia Naturae* (*Natural History*, ca. 79 C.E.), Roman encyclopedist Pliny the Elder referred to the emmer species generally as *far adorem* (glorious grain) and specifically as *semen adorem* (glorious seed), an elevation linked to its role in altar offerings and in state gifts to victorious generals. Pliny described rigorous bread making in Ancona, Italy, on the Adriatic coast. Bakers steeped *alica* (emmer groats) for nine days in raisin wine before kneading. After forming a long roll, bread makers baked the dough in a clay pan and soaked the finished *panis depsticius* (shaped loaf) in milk or dessert wine before serving. Until the Middle Ages, emmer wheat dominated grain production north of the Black Sea in Moldavia and the Ukraine until the arrival of bread-wheat seed to central Asia.

In current times, soft, hull-less bread wheat prevails, especially in industrialized countries, but farmers still grow wild emmer in Ethiopia, India, Iran, Iraq, Israel, Jordan, Syria, and Turkey. Because of twenty-first century demand, cultivation of emmer wheat is advancing in Albania, Italy, Morocco, Spain, and Switzerland. In Sagalassos, Turkey, boiled bulgur wheat is a popular winter food in rural areas. Italian farro, the modern descendent of emmer wheat and a relative of durum wheat, anchors a number of foods including biscuits, boiled cereals, cookies, macaroni, and spaghetti. Its high-protein makeup and structure suit the needs of people with gluten allergies as well as famine food banks, local foods restaurants, and gourmet and vegetarian markets.

See also: Agriculture; Cereal; Einkorn Wheat; Fertile Crescent Diet and Food Trade; Hybridization.

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Endangered Species

A plant or animal that sinks too low in numbers to survive, an endangered species heightens depletion of the world's nutritional and medicinal security and dietary diversity. For example, the extinct aurochs and pupfish left no free-ranging populations to replenish their kind; no spores remain to pollinate stands of giant fern, a common famine food and thirst quencher.

Currently, the International Union for Conservation of Nature oversees the status of 1,556 organisms threatened by disease, overharvesting, pollution, and climate change. Among them, 700 are food items. The most threatened habitats exist in the Americas, followed by Russia and Africa. In Sweden, forestry techniques infringe on habitats of berries and mushrooms that constitute heirloom plants and heritage foods. In China, the exploitation of exotic flora and fauna—bear, crocodile, ginseng, pangolin anteater, pine nuts, rhinoceros, tortoise—for medicines and tonics perpetuates folk demand for spurious health foods as sources of well-being and longevity.

Some wild food types—the Bactrian camel, baobab, Chinese alligator, hazelnut, leatherback sea turtle, monk seal, ohelo berry, pawpaw—exist in critically limited supply. Of concern are such species as American bison, baobab and butternut trees, conch, flying squirrel, milkvetch, narwhal, New Zealand mollusk, polar bear, round-leaf shadbush, sea lion, sturgeon, and wild water buffalo. In 1973, the Endangered Species Act protected imperiled amphibians, fish, mammals, and poultry as well as crustaceans and mollusks by shielding their habitats from biocides, human encroachment, and poaching. Resultant conservation has effectively increased populations of some vulnerable edibles, including aloe, gentian, ginseng, gray whale, grizzly bear, Hawaiian goose, key deer, pineapple cactus, sea algae, and wild buckwheat.

The loss, exploitation, or lessening of coastal staples— such as abalone, Aleutian geese, auk, cod, kelp, lobster, wild salmon—as well as the impacts of ecological deterioration, industrial contamination, and invasive species threaten the range of diet available to shoreline populations. Regulation of exploited areas interferes with corporate profits, sources of jobs, and multinational competition for a stressed ecosystem. As a result, habitats such as the fisheries off Newfoundland, Hong Kong, Japan, and the oil-damaged Gulf of Mexico have less opportunity to repair and recover sustainability. When shore harvesters and trophy fishermen vie for the remaining supply— such as green turtles, North Sea herring, right whales, sea otters, sharks, and sockeye salmon—commodities develop a cachet as exotic cuisine and luxury dishes, notably bluegreen algae, fugu, shark fin soup, and turtle eggs.



Workers at a Chinese fish-processing facility remove a shark's fin, a delicacy in high demand for traditional shark fin soup. A billion-dollar industry, finning constitutes a serious threat to the global shark population.

(China-FotoPress/Getty Images)

Because wild foods gathered and consumed by nomads and isolated hunter-gatherers have no commercial value, species salvagers underestimate their worth, as with black walnuts prized by Southwestern Indians. Since the World Food Summit of 1996 in Rome, 187 nations have promoted the United Nations demands for food that is environmentally sound and socially just. The goal is global food

access and nutritional security, such as the preservation of large rodents and wild pigs eaten in Latin America and the abalone, eulachon smelt, and suckers that feed indigenous peoples of the Upper Klamath Lake in the Pacific Northwest.

One answer to the decrease of wild species, botanic gardens and green houses preserve specimen plants for future development, such as the Swedish mycorrhizal mushroom. Another rescue method, farm-raised stock augments the supply of bluefin tuna, salmon, tilapia, and turtles. Starter pieces of coral permeated with endangered seaweed protect the dwindling supply, as raised in landlocked ponds in Molokai, Hawaii, until it is ready for transplanting. An oblique philosophy supported by vegetarians and vegans proposes that the abandonment of meat in the diet offers a quicker and fairer means of restoring animal species to wild habitats.

See also: Buffalo; Cod; Fish and Fishing; Seed Trade; Taboos, Food; Whaling.

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[Escoffier, Georges Auguste \(1846-1935\)](#)

From the Napoleonic era to the belle époque, Georges Auguste Escoffier, the “Father of Modern French Cuisine,” enhanced French cooking by designing color-matched meals and striking ice sculptures.

Born in Villeneuve Loubet on Oct. 28, 1846, Escoffier apprenticed at age 12 with his uncle as a saucier at the Restaurant Français in Nice, where he became

the first great chef to learn his art in a public venue. His employment at the Petit Moulin Rouge in Paris ended in 1870 for kitchen service to the Army of the Rhine during the Franco-Prussian War. In peacetime, he made celebrity appearances at the Grand Hotel in Monte Carlo and the Hotel National in Lucerne, Switzerland, and opened at Cannes his own restaurant, Le Faisan d'Or (The Golden Pheasant).

In 1890, Escoffier brought Gallic flair to London's Savoy Hotel, where he shared supervision with hotelier César Jean Ritz. Escoffier's coordination of the *brigade de cuisine* (kitchen staff) demanded cleanliness. He generated order in the first à la carte menu and Russian-style service, presenting one course at a time. His squad of culinary officers specialized in particulars—the *garde manger* presiding over cold food, the *entremetier* over soup and vegetables, the *rôtisseur* over grills and roasts, the *saucier* over sauces and *fumets* (fragrant additives), and the *pâtissier* over pastry. His style in the preparation and plating of hearty dishes earned the praise of the Prince of Wales, Austrian singer Nellie Melba, French actress Sarah Bernhardt, and Italian composer Gioachino Rossini.



Dubbed “the King of Chefs and the Chef of Kings,” Auguste Escoffier simplified, modernized, and popularized classical French cooking in the early twentieth century. His *Guide Culinaire* (1903) remains a classic of French haute cuisine. (Hulton Archive/Getty Images)

With Ritz's aid, Escoffier quickly turned foreign princes and British gourmards into proponents of haute cuisine. Innovators in the late 1890s, the duo established the kitchens of the Paris Ritz, the Grand Hotel in Rome, and London's Carlton Hotel and staffed them with cooks trained in the splendor and operatic drama of French table art. Mentored by chef Félix Urbain Dubois, Escoffier influenced the wealth of European restaurants that opened in the early 1900s and served some 500 guests daily. He insisted on the best in equipment and urged his workers toward speedier food presentation at appropriate temperatures. The Michelin Guides promoted luxury hotels in 1900 by listing nonpareil food that suited diners' habits and tastes.

Escoffier captured the fundamentals of *haute cuisine classique* (classical elegant cookery) in a monumental text, *Le Guide Culinaire* (1903), a meticulous compilation of more than 5,000 recipes. He sold house label sauces, which offered in bottles the savory mixes he invented. For Hamburg-America Lines, he installed the first à la carte dining aboard ocean liners with such specialties as young venison, asparagus with mousseline sauce, pureed chestnuts, peach Melba, and flaming plum pudding. He finished fish, meats, and vegetables with the best of butter, caviar, champagne, cherries, grated parmesan, hearts of romaine, olive oil, truffles, and velouté sauce.

On June 18, 1906, table service aboard the SS *Amerika* began with Swedish hors d'oeuvres, Greek lettuce, and iced consommé and included sole in Rhine wine, quail with raisins, and Soufflé Surprise d'Orange. The meal so impressed Kaiser Wilhelm II that he dubbed Escoffier the "Emperor of Chefs."

Escoffier set the standard of war time cookery and earned a French Legion of Honor award for sending food packages to troops and their families. He trained professionals at the Carlton and influenced Chinese pastry chef Ho Chi Minh and English food professional Agnes Marshall, who introduced the English to the ornate glories of assemblies and receptions. After retirement in 1919, he expended his energies at professional expositions and in writing *Ma Cuisine* (*My Cooking*, 1934). His disciples, including American chef Julia Child, formed culinary associations in America, Europe, and Japan.

See also: Dubois, Félix Urbain; French Diet and Cuisine; Grilling; Haute Cuisine; Sauces and Saucing.

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Espaliering

A practical use of gardening space, espaliering spreads the branches of shrubs and trees horizontally over a flat plane. Tidy pruning inhibits shoots branching obliquely or vertically, a horticultural style that George Washington applied to crab apples at Mount Vernon, Virginia.

An ancient, high-maintenance method of training vines and fruit trees against a stationary object, espaliering developed into living sculpture, such as the heavily pruned vines at Yufeng Temple, built outside Lijiang, Yunnan, in 1756. The method derived its name from the French for “shouldering,” a Prussian military term for the shouldering-in of infantrymen in a tight row. The concept enhanced beauty and privacy while making use of limited space and sunlight in walled cities, screening out wilderness and surrounding culinary rows made unsightly by gradual harvesting of cole plants and the digging of root crops. In Japan, espaliering gave outlets to dwarfing specialists who engineered miniature fruit orchards.

Throughout Belgium, France, Germany, and Holland, trellised fruiting patterns provided visual interest to otherwise dull architecture. Cast-iron nails prevented rust and the dislodging of mortar, but some specialists preferred sheepshanks and wood pegs. Branch ties varied from cloth and chamois leather to more naturalistic bast, bulrushes, osier, and withy. Italian gardeners sometimes placed glass wine flasks over budding fruit and harvested the full piece for bottling in

syrup.

In open spaces, free-standing trellised plants formed *contre-espaliers*, natural dividers usually low enough to avoid shading herbs, knot gardens, and low-growing vegetables. Low walls were more suited to currants, dwarf stone fruit, gooseberries, and raspberries. For walkways or pergolas, U-shaped frames and interconnecting wires trained limbs into a shady tunnel, such as one at Foxglove Spires in Tilba Tilba, New South Wales. Another creative form of trellising used a latticed hedge of apples to make fruit reachable for netting and harvesting.

Architectural Gardening

In the Middle Ages, pruned fruit and nut trees adhered to a trellis chimney, or rampart-decked walled castles, manses, and monasteries. During the Renaissance, Europeans rediscovered ancient Chinese espaliering techniques for growing the jujube and loquat in Y shapes. In Italy in the early 1500s, a belvedere on Isola Madre on Lake Maggiore supported espaliered vines and Ligurian citron and lemon trees that shaded the interior while supplying fragrant blooms and fruit. A common espaliered plant of the period, the tomato advanced from hotbeds to sunny walls to grow as ornamentals and sources of aphrodisiacs.

The flight of Huguenots from persecution in Flanders and France after the St. Bartholomew's Day Massacre of 1572 sent market gardeners to a refuge in England. Their trademarks throughout East Anglia, Kent, and London involved hedges of dwarf apple and plum trees grown on a lath trellis into fruit partitions. After 1610, Jacques Boyceau, the gardener for Louis XIII and author of *Traité du Jardinage* (Treatise on Gardening, 1638), advised on pruning and training plants to mimic nature. Because of the Dutch landscaping introduced to England with the crowning of King William in 1689, the English turned dwarfing trees and trellising into a gardening craze.

Eighteenth-century landscapers used trellising as a means of imposing geometric order and symmetry on wild nature, such as the netting grove at Villa La Quiete in Florence, home of Anna Maria Luisa de' Medici, and the recessed fruit arcades at Plympton House in England, planted in the early 1700s. At Versailles, the Potager du Roi (king's kitchen garden) of Louis XIV displayed 44

complex mazes of procumbent plant limbs groomed and harvested daily within a hand-reach. His master gardener, Jean-Baptiste de la Quintinye, increased fruit diversity by grafting fruit to foreign stock and by anchoring multiple cultivars in a small space, thus enabling cross-pollination. His use of sun-heated walls engineered a microclimate, a basis of present-day solar cultivation of fruits and vegetables.

Advanced Orchardry

During the early Victorian era, the trellising of orchards fell into disfavor. Landscapers grubbed out stock that had been in place for 150 years. In the second half of the nineteenth century, intellectual curiosity prompted gardeners to return to grooming and forcing techniques. Scientific interests influenced such experiments as the grafting of pear limbs on hawthorn. In 1868, Irish gardener William Robinson advanced neater trellising with eyed nails and wire that he ratcheted tight. The final effect kept the understory warm in spring and placed fruited limbs at child height, encouraging early interest in botany and food production and harvesting. The cultivation of espaliered fruit spread to the British colonies, producing fragrant pomegranate walls in India for fruit used in beverages, sherbet, and sweets.

Currently, espaliering enhances the view while encouraging early growth against the solar-heated stone confines of gardens and courtyards. By choosing a south wall, the gardener shields fragile growth and unripe fruit from wind and nudges fruit to early ripeness in plants normally limited to a warmer clime. The shaping of euonymus, holly, pyracantha, rosemary, and yew creates a windscreen and limits dense growth that reduces air circulation and harbors pests. The method intertwines apples and pears and the shaping of trees, such as almond, apricot, cherry, citrus, crab apple, fig, olive, peach and nectarine, plum and quince, and pomegranate, and grapevines, melons, and sea grapes. Espaliering also stimulates the growth of plants and trees that provide valued aromas, medicinal properties, and flavorings, particularly anise, juniper, myrtle, and witch hazel.

By restraining new growth and shaping it in artistic candelabras, cordons (rope

ladders), diamonds, fans, hedges, lattices, loops, palmettes, pyramids, T's, and umbrellas, the gardener channels plant energy into a higher yield and oversized fruit, such as a pear produced in Guernsey, one of the Channel Islands, weighing 28 ounces (794 grams). In the twenty-first century, espaliering remains in vogue as a form of permaculture, a creation of permanent landscaping with berry bushes and fruit and nut trees.

See also: Japanese Diet and Cuisine; Medieval Diet and Cuisine; Silk Road; Theophrastus.

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Exotic Food Clubs

The exotic food fancier has thrived from ancient times on meals of atypical or taboo ingredients, some imported over great distances. Just as Romans valued dormice as prestige foods, Spanish conquistadors carried chocolate and chilies from the New World back to aristocratic European tables. In the 1870s, eastern U.S. restaurants turned buffalo tongue into a must-have entrée for the elite. The fad hastened the demise of migrating buffalo herds.

In England, the absence of variety during World War II spurred decades of group gourmet initiatives. In 1949, the privations of rationing and shortages inspired historian Raymond Postgate to found the Good Food Club. Members sampled and critiqued the most venturesome of London restaurants in the *Good*

Food Guide, founded in 1951. From the stimulus, British gourmands began tasting Chilean pinot noir, duck heart risotto, herbed vinegar, and Thai fish cakes. In the United Kingdom, as a service of the Fine Food Club, Bernice Hurst, a cultural consultant in Reading, Berkshire, accommodated tastes by offering mail-order rarities.

Food maven Julia Child got her start in cooking in a Paris food club, the Cercle des Gourmettes. In the United States in the mid-1960s, followers of her television show from WGBH in Boston spawned their own cuisine clubs. Neophyte French chefs imitated Child's methods in lacing up a holiday goose, reaming Israeli blood oranges, and whisking a smooth sabayon (a sauce of egg yolks, wine, and seasonings). Fervid Julia fans purchased German cleavers and French raclette pans as well as unusual spices and flour from foreign dealers. The group adoration inspired a feature biopic, *Julie & Julia* (2009), a re-creation of a blog in which author Julie Powell chronicles her mastering of Child's recipes.

In the 1970s, food curiosity inspired such ventures as the Cheese and Wine Club, Chocolate Connoisseur's Club, International Food Club in the Florida Keys, and Popcorn of the Month, which featured Cajun, peanut butter, pecan, and white chocolate drizzles. In mockery of conspicuous consumption, counterculture groups turned hippie food samplings into perusals of power by serving working-class menus—Mediterranean bouillabaisse and paella, Moroccan mutton tagine, and Mississippi River delta alligator gumbo with red beans and rice. Craig Claiborne, food critic for *The New York Times*, supported ventures into proletarian fare by introducing readers to ethnic menus.

Distance determined the exoticism of foods, which could be ordinary in remote places but rarefied by inaccessibility. After the Vietnam War, returning soldiers sought the unique foods of Southeast Asia—ant eggs, bull penis, cobra heart, pigeon heads, silkworm larva, snails with noodles, and snake bones. At the head of the list of memorable meals, Westerners popularized *nuocmam* (fermented fish sauce), a common salty soup flavoring or topping for raw entrées and salads. A parallel upsurge in sushi in the 1970s claimed a Japanese specialty as a healthful combination of raw fish and rice. The pursuit of Asian delicacies turned some food club members into purchasers of imported fugu, a poisonous fish. Club members also became regulars at immigrant mom-and-pop restaurants in major cities and popularizers of chai tea, pad thai, and sashimi.

Foodies, the slang term for culinary hobbyists, cherished memories of foreign table exotica, such as the square Malaysian watermelon grown in a glass box or roasted baby goat's head. Museums established foreign food clubs for youths, a boost to children's table sophistication. In the Philippines, Western diners sought alien fare in Angono, Rizal, where they chose between monitor lizard and tree snake.

In July 1989, the eighty-fifth annual dinner of the Explorer's Club at the Waldorf-Astoria in New York City showcased an exotic food banquet. The menu featured dishes from Asia and the Pacific Rim: Australian hare with kiwi and yams, China Sea grouper, Malaysian dove with bamboo shoots, Seychelle Islands reef fish, Southeast Asian reptile stew in paprika sauce, and Tibetan roast yak and ram curry. The spread kept pace with other club dinners, for which chefs stir-fried worms and presented maggot-ridden strawberries, duck tongues on endive kangaroo meatballs, and scorpions on toast.

Adventuresome travelers choose China as a reliable source of varied exotica, such as black rice, a popular item with the Beijing Exotic Foods Club. In Canton, entrées of butterfly cocoons, cat and dog stew, fertilized duck or quail eggs, live octopus, roast rat, scorpion canapés, and sea cucumber satisfy curiosity about food oddities. The use of meta phoric names—Dragon and Tiger Fighting—elevates the spectacle of such place marvels as snake with tripe. Dishes of live shrimp and squirming fish for sushi surprise Western gourmands, who are not used to killing their own selections.

Immigrant populations further the formation of exotic food clubs. Denmark foodies promote the tastes and traditions of enclaves of Africans, Chinese, Pakistanis, Thais, and Turks. Other locales offer authentic street food, a strollers' choice of Filipino eel and frog's legs, Korean *eomuk* (pureed whitefish on a stick), or fried Chinese beetle larva or crickets on a skewer. In July 2011, a New York City gastronomy club gathered around a Korean food truck to sample a menu of century eggs, grilled chicken gizzards, pig's blood and chive salad, and sea snails.

The launching of Internet food clubs has made available such flavorful game as alligator and rattlesnake, free of antibiotics and growth hormones. Cuts of bison from Ultimate Food Club in Washington, New Jersey, and other U.S. suppliers parallel beef butchery with burgers, filets, pot roast, prairie-raised chops, ribs, and steaks. Choices of buffalo or rabbit sausage, elk medallions, and wild boar loin

tempt red meat eaters. Other entrées— breast of pheasant, ground ostrich, and whole Muscovy duck with foie gras—vary the standard poultry recipes. The Rare Olive Oil Club identifies samples by name— Frantoio from Chile, Pasolivo from northern California, Peranzana from Molise, Italy, Roi from Liguria, and Yellingbo from Australia. Investors in unique oils order stock online from Zingerman's in Ann Arbor, Michigan.

The availability of rare edibles introduces American and European members of gourmet food-of-the-month clubs to unusual aromas, color, flavors, and textures. Samplers taste subtropical betel leaf, durian, Jerusalem artichoke, loquat, mangosteen, nogal, rosemyrtle berries, Surinam cherry, and satsuma. Carambola, or starfruit, and kiwi have gained favor more as garnishes than as featured ingredients. Successful matches between tastes and food explorers have increased world demand for carob, chayote, jujube, lychee, and sapodilla and a following for produce from the California Rare Fruit Growers. Processed foods offer artisanal cheeses and wines, caviar spreads, lemon curd, panko crumbs, and fruit salsas made from guava and mango. The discerning have turned key lime, pita chips, pomegranate, sun-dried tomatoes, and water chestnuts into kitchen and restaurant staples.

See also: Child, Julia; Haute Cuisine; Lapérouse, Jean François Galaup; Maritime Trade Routes; Taboos, Food.

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F

Fads

Eating patterns based on fads may ignore long-term health needs while satisfying the individual's urge to follow the crowd. Historically, food crazes have circumvented heritage cuisines by focusing on fashionable ingredients, such as chai tea, quinoa, roasted peppers, soy sprouts, sun-dried tomatoes, tofu, wraps, and yogurt. Popular dishes—cupcakes, curry, hummus, pineapple upside-down cake, pita sandwiches, and Swedish meatballs—have accorded temporary chic to unusual food combinations and elevated to a food frenzy such oddities as deep-fried dill pickles and Twinkies. More detrimental to nutrition, fad cures make unsubstantiated claims that wheat germ and trail mix boost stamina and the grapefruit diet burns fat. In addition to exaggerated commentary on diet, trendy cures tend to demonize a particular regimen or food type, such as all carbohydrates or fats.

Over time, cooking techniques and equipment spawned a royal demand for Arabian sherbet and live songbirds baked in a pie in the early Middle Ages, gingerbread imported in the 1000s during the Crusades, the beginning of the Japanese tea cult in 1190, Mongolian koumiss in China in 1280, macaroni and frankfurters in the 1500s, and a rush to buy ice cream freezers and dessert molds in the 1880s. De cade by de cade, food faddists created a demand for technological marvels—blenders and juicers for fruit smoothies and diet drinks in the 1930s, barbecue grills and Bundt pans in the 1960s, Sterno-fired fondue sets for coating bread in melted cheese or strawberries in chocolate in the late 1960s, Crock-pots for slow-simmered stews and chili in 1971, and fry pots for deep-frying turkeys in the early 2000s. In May 2011, the famous Chelsea Flower Show in London presented edible flowers, ranging from old favorites—chives, lavender, nasturtiums, rose hips, and violas—to Asian salad herbs and squash flowers for stuffing.

Food processors launch new ideas by hyping ingredient manipulation, such as

Spam, Cheetos, and Krispy Kreme doughnuts. In the 1950s, television spurred enthusiasm for Jell-O, TV dinners, and frozen fish sticks and vegetables. Waves of zeal for brand names—Graham crackers, Grape Nuts, Häagen-Dazs, Kool-Aid, and Tang—often derived from successful advertising visuals and popular jingles. The food snobbery of the 1980s elevated pink peppercorns, pineapple chutney, and sushi as the exotica of the moment. The media exploited nutritional ignorance by broadcasting unsubstantiated medical claims and glittering generalities about kefir for soothing the stomach, pomegranates and acai and goji berries for their high vitamin C content, and salmon for its omega-3 fatty acids, which protect the heart.

The thrust of fast-food psychology on students, office workers, and drivers eroded the notion of breakfast, lunch, and dinner. The retailing of boxed takeout, microwave popcorn, and carbonated fountain drinks created a period allure enhanced by the electronic media. Driven by instant gratification rather than the satisfaction of preparing nutritious foodstuffs into well-rounded servings, food trendiness catered to convenience and eye appeal rather than adherence to food wisdom. Individuals filled their stomachs with fad foods—yogurt in a tube, nachos, power drinks—in the same way that they replenished their gas tanks, with gulp-and-go fuel that immediately energized.

Sociologists list a number of interlinking attitudes and perceptions that keep the American diet and restaurant business in flux. Because of a history of waves of immigration, the national diet has shifted periodically, as with the importation of Jewish dill pickles, German lager beer and sausages, Italian pasta, and Mexican tacos and salsa. Wherever it occurs, capitalism seizes on new tastes, aromas, and textures—black rice bran, egg rolls, energy bars, fajitas, gyros, pad thai, even designer water—and commercializes their mystique.

See also: Exotic Food Clubs; Fusion Cuisine; Gourmet Cuisine; Nouvelle Cuisine; Slow Food.

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Famine

Prolonged hunger and lethal malnutrition attest to the centrality of food distribution and stockpiling in human survival. Historically, the lack of sustenance repeatedly threatened China, Egypt, England, Ethiopia, India, Japan, Russia, and Somalia. In 1051, starvation destroyed the Toltec of central Mexico. Natural causes—cold, crop failure, drought, flood, insects and vermin, and typhoons—share blame with human factors such as inadequate food distribution and rationing, profiteering, tyranny, and violence, and the impacts of inflation, migration, and epidemic diseases.

War produced its own forms of torment, such as the Assyrian spread of mineral salts and weed seeds over destroyed cities. The concept of killing future agriculture recurred in Pope Boniface VIII's plowing and sowing of the town of Palestrina in salt in 146 B.C.E., the decimation of Mesoamerica by sixteenth-century conquistadors, and the starvation during the German occupation of Holland in winter 1944–1945 that forced the Dutch to unearth and consume flower bulbs.

During the famines of prehistory, subject tribes migrated to richer strongholds to barter for subsistence foods or applied the strategies of hunter-gatherers. After the settlement of Mureybet and Abu Hureyra east of Aleppo in western Mesopotamia (Syria) in 11,050 B.C.E., a millennium of drought forced the Natufians, the earliest settled people of Palestine, to adopt agrarianism by caching grain in storage pits as famine food. The experience presaged future civic planning that protected clans from starvation and the need for food raiding. Preparation for drought and crop failure prevented lengthy migrations to sources

of water and sustenance.

Africa and Asia set a global example of coping with food shortages. A drought in 2150 B.C.E. struck Upper Egypt from Thebes southward, causing the demise of the Old Kingdom. Field workers and quarriers became the first to die from want and malnutrition. Official documents stated that starving adults cannibalized their children. To minimize losses in the labor pool, the state operated grain silos and reservoirs that stored surpluses for times of meager harvests. To address uneven grain distribution, bureaucrats allotted standard portions to citizens. Royal agencies paid workers in beer, bread loaves, grain, oil, or vegetables rather than cash.

Because of wise administration, Egypt became a source of relief to surrounding nations in famine times. In the tenth century B.C.E., the book of Exodus described the plight of the Canaanites of Palestine. The Hebrew patriarch Jacob, the sire of a dozen sons, sought to buy grain in Egypt, where Joseph, the lost eleventh son, had spent seven years storing food surfeits against a prophesied famine. On the family's second journey to purchase grain, Jacob offered cash as well as almonds, balm, honey, myrrh, pistachio nuts, and spices in trade. As a hedge against future suffering, Joseph resettled his aged father in Egypt, North Africa's model civilization for protecting citizens from catastrophe.

The Middle East and Rome

In western Asia, empires in the Fertile Crescent initially fed more people with less effort than neighbors in China and India. Beginning with the Medes in 1000 B.C.E. and advancing to the Achaemenid Empire in 550 B.C.E., Persia grew into the ancient world's largest empire and the most noted for abundance and generosity to the needy. Under the Achaemenid kings, government control and stockpiling prevented famine.

In northern India, Kautilya, a Brahmin adviser to the emerging Maurya Empire, composed the *Arthashastra* (*Statecraft*, ca. 300 B.C.E.), which advised the Emperor Chandragupta on citizen entitlement to sustenance. Kautilya asserted the emperor's responsibility to open the imperial store house of grain and seeds and to use food as pay for public workers completing irrigation lines and military

installations. Kautilya also stressed that farmers deserved tax exemptions as well as free irrigation systems and seeds. Because of India's security, a 140-year period of peace and prosperity furthered agriculture, education, law, and trade with Malaysia for spices and exotic food. An innovative use of border tribes turned food gatherers and dealers into trappers of wild animals and lookouts for marauders.

To the west, Rome emerged as an urban metropolis that grew no crops. Citizens depended on Egypt, the ancient world's major grain seller, to stave off food shortages. Because of its burgeoning population and reliance on wheat imports, the Roman Republic dispatched Consul Gnaeus Fulvius in 230 B.C.E. to stop Illyrian pirates from waylaying grain convoys from Egypt, North Africa, and Sicily. Within two years, Fulvius ensured a steady grain supply by suppressing piracy around the Black Sea and along the Red Sea. Safer sea-lanes restored the Roman military to full provisions and rid Rome of its fear of famine.

To feed the plebeian class, Augustus, Rome's first emperor (r. 27 B.C.E.–14 C.E.), instituted the *annona* (poverty relief), for which he imported 14 million bushels of wheat per year. Decades later, encyclopedist Pliny the Elder lauded the Italian Piedmont for producing *secale* (rye), a local famine food that was easily transported over Roman roads.

In 284 C.E., the Emperor Diocletian feared a migratory trend to the city and the desertion of farms, which threatened food markets. In Rome's declining days in the late 300s C.E., after the failure of taxation and the economy, food transportation ceased. Authorities banished aliens and travelers, which the city could no longer support. The siege of the Visigoths in September 408 C.E. forced the city into a food panic, and the reduction of the daily wheat ration from one-half to one-third precipitated the fall of the Roman Empire. Over the next four centuries, Rome's population declined by 90 percent from hunger and disease.

Asia

The defeated Roman Empire resettled at Byzantium and faced more waves of drought and famine to the east and south in Arabia, India, and the Levant. In 638, perishing Bedouins, trapped by hunger and epidemic, sought a last chance at

urban food rationing stations in western Arabia at Medina. To rescue them, Caliph Umar ibn al-Khattab coordinated an ingathering of supplies from Iraq, Palestine, and Syria. The caravan of Abu Ubaidah, governor of Syria, stretched from his ware houses to Medina's refugee camps. He traveled with the provisions to the famine center to manage disaster relief. With the supplies, Umar fed evening meals to some 100,000 beggars. When the rains returned in 639, he quartered displaced persons until they could reestablish themselves.

Some two centuries later, profligacy with the food supply threatened to depopulate eastern China. Under the Tang Emperor Yizong, the nation incurred drought and flooding beginning in 860 that destroyed cropland. While the imperial court pursued extravagance and military conquest, peasants struggled to continue buying seed and to locate disaster and tax relief. A rebellion in 875 threatened Henan Province with a military coup. Because of seven years of grassroots revolt, destruction of farmland and the coercion of men into uniform left the region in worse condition. When provisions failed, soldiers turned to cannibalism.

On the First Crusade in 1096, grain scarcity proved more lethal than arrows. The Christian vanguard foolishly traversed lands that lacked the provisions to sustain armies. While supply trains imported barley, beans, chickpeas, dried fruit, lentils, and wheat more than 3,000 miles (4,800 kilometers) from Europe to the Middle East, Christian soldiers violated Jewish farms in Champagne and Rouen by demanding food donations. In 1097, France suffered both epidemic and starvation and the loss of 100,000 lives. Farther southeast along the route to Jerusalem, Palestine lost 500,000 people to famine.

Provençal forces continued to live off local supplements throughout winter 1097–1098, when Saracens cached their pantries and retreated to caves. In cold months made gloomy by starvation and epidemic typhoid fever, the Calabrian Captain Bohemond, Robert of Flanders, and Tancred of Normandy led 20,000 soldiers to purloin cattle, corn, fodder, and wine along the Orontes River through Lebanon, Syria, and Turkey. Others sailed for Cyprus in search of famine relief, which enabled crusaders to capture Antioch on June 28, 1098.

Western Hemisphere

In the New World, preparation for calamity involved stockpiling of fish and meat along with herbs and berries. Proactive plans protected native peoples from shortfalls. During periods of high productivity, they worked to prevent future starvation through numerous food preservation methods—brining, caching, dehydrating, drying, fermenting, freezing, and smoking.

When famine assailed the Inuit of Greenland, they consumed catfish and red seaweed as well as discarded pelts and partridge and reindeer intestines along with the animals' dung. At Barbuda, agropastoralists staked out animals to manure plots of dasheen, a nourishing South American famine food. Cooks adapted hillside greens to varied recipes. Amaranth and manioc leaves, collards, mustard greens, and sorrel provided salads, steamed vegetables, and thickeners for fish stew and meat soup. Islanders boiled callaloo and plantain with eddo and yam and flavored the mix with cayenne pepper and sea salt.

Catastrophe struck aborigines to the southwest from 800 to 1000 C.E., destabilizing the Maya of Mesoamerica and their empire. In Peru, to protect the Inca from grain and meat scarcity, rulers controlled the hunting of wild game to allow nature to replenish itself. Imperial agents stockpiled as much as a seven-year supply of food in silos and ware houses. Over extensive territory, the state guaranteed peasant survival by networking food distribution to even out crop failures with abundant harvests from other regions.

In February 1502, Queen Isabella appointed Friar Nicolás de Ovando, a Spanish colonial governor, to direct a fleet of 30 Spanish ships to Hispaniola. Cave paintings illustrate the attempts of the Taíno to welcome their conquerors with native bread delivered by boat at the landing.

The settlement of 2,500 colonists threatened the survival of 500,000 Arawak, Carib, and Taíno aborigines of the West Indies. From a combination of atrocities, despair, enslavement in cane fields, epidemic smallpox, infanticide, and starvation, the Indian population fell by 88 percent, to 60,000. After the colonists imported African slaves to replace Indian press gangs, the Taíno led African runaways into the hill country to escape the mounting genocide, surviving on meals of lizards, spiders, and tree roots.

Historic Struggles

In horrendous case studies, historians have analyzed the elements of starvation for interrelated causes. In British-controlled Bengal and Bihar during a drought in 1769, the British East India Company forced reallocation of Bengali farmland from grain and rice cultivation to indigo and opium poppies, sources of tax revenue. Hungry farm laborers, lime workers, and weavers retreated to the jungle to forage for bark, grass, leaves, and nuts.

In Patna in January 1770, some 8,000 beggars clogged the streets, dying at the rate of 50 per day. In Calcutta in April, corpses lay in the highways, attracting jackals and vultures. Street sweepers collected remains and hurled them into the Ganges. Rumors of cannibalism, consumption of taboo cows, and the spread of smallpox coincided with depopulation. From summer to fall, the loss of food crops to rural people in the lower Ganges plain initiated a famine that killed 10 million, reducing the population of Bengal by one-third. In 1771, British mismanagement of rice distribution allowed profiteers to elevate prices to ten times the normal cost, exacerbating the malnutrition that ravaged the Bengali. From hunger grew crime, as gangs of thugs seized food shipments for sale to the highest bidder.

Irish Potato Famine

One of the most publicized famines of history, the Irish Potato Famine of 1845–1848, a severe period of starvation for the island's poor, resulted during English domination of smallholders. Forced to earn cash by selling their dairy products and grain, peasants kept none for their own use. During the Great Hunger, their typical daily per person consumption of up to 12 pounds (5.4 kilograms) of fish meat, and cabbages, potatoes, and turnips from home gardens fell to little and then none.

News of the onset of famine on the Isle of Wight reached Tory Prime Minister Robert Peel in August 1845, but he, Whig leader John Russell, and Queen Victoria took virtually no action to feed the needy. Landlords, backed by the Crown, refused to exempt farmers from rents for the duration, thus forcing the poor into beggary.

Unlike previous crop failures and market dearths, Ireland's tragedy stemmed

from dependence on “lumper” potatoes, a single homegrown staple, and the lack of cash to buy other foodstuffs. Planted in small kitchen plots extending from front door to front gate, the potato returned twice the yield of oats and wheat in Irish fields from Connaught to Munster. During a spurt in Ireland’s population to 8 million in 1841, tubers nourished and enriched rural agrarians and supplied herds with forage. The population increase made the island nation the world’s densest area and the most susceptible to a food deficit. In west Ireland, farmers, who delighted in the potato’s easy cultivation, rotated no crops and sought no new strains or clean seed to supply their kitchens with potatoes for the national dish, “tattie” cakes, which they consumed with buttermilk.

Because lumper tubers were offshoots of the parent crop, the *Phytophthora infestans* fungus, perhaps imported from Peru in 1844 in a shipment of guano, devastated potato fields. During a moist growing season, the one variety of potato succumbed universally to an air-and waterborne blight of leaf, stem, and tuber rot. The decay proved so foul that families had to leave their doors and windows open. The tubers that survived spread rot in storage. Those who ate putrefying crops died, and those who fed them to livestock caused death in cattle and swine herds as well.

The Irish had no safety net beyond fishing. Agrarian families fell behind in rents, sold their belongings, and incurred eviction. The dispossessed fled to the bogs and turned to holes in the ground roofed with turf to house themselves. Lacking provisions, children degenerated to skeletal limbs and succumbed to cholera, influenza, marasmus, and tuberculosis.

While the British dominated food import and distribution worldwide, the destitute died on land and sea en route to opportunity in industrialized America and Canada. Because English landlords and tax collectors continued to bear down on the peasantry, the global media began viewing the situation as genocide. On September 9, 1845, the British press declared a state of emergency, which British Prime Minister Robert Peel attempted to alleviate with stores of corn and meal from India and the United States. Peel’s relief commission employed 140,000 peasants to upgrade the Irish infrastructure with bridge, canal, dock, drainage, and road projects. Emaciated laborers often died in ditches with shovels in hand. To ease poverty, on May 15, 1846, the government repealed the Corn Laws, a tariff on imported grain, and set aside £365,000 in loans. It was too little too late,

however, as the increase in jobs and aid failed to feed the hungry and compounded the problem by creating a welfare-dependent subclass of bitter, landless Irish paupers.

Analysis by the Horticultural Society of London on February 16, 1846, predicted the subsequent annual shortfall of potatoes due to the disease. The year's crop failure plus the government's closure of relief programs forced families to eat boiled cabbage leaves, nettles, roots, and seaweed. Beggars roamed Cork and Dublin. In ditches and sod huts, typhus killed off the weak.

To stem a protest march in Roscommon, the government called out mounted dragoons. Meanwhile, charity took the form of grain shipments from the Ottoman Turks and funds amassed from the Choctaw in Oklahoma, Pope Pius IX, Queen Victoria, and soldiers and employees of the East India Company in Calcutta. Protestant relief workers destroyed their credibility by doling out meals along with condemnations of Catholicism.

Homeless widows and orphans camped in the woods, living like foraging animals and cannibalizing the remains of the dead. Some had themselves arrested to take refuge in jail, where they at least had a bed and guaranteed prison food. Others hoped to be transported to British penal colonies in Australia. Of the many children boarded at Skibbereen work houses, more than half died. To save themselves, the surviving Irish, some of the best of the nation's farmers, launched a vast diaspora approaching 1 million emigrants by the beginning of 1846.

Those left behind lived through the spring and summer to suffer "Black '47," the late-winter depth of Ireland's misery, when another 100,000 set out for North America. Through the worst of want, satirists writing for *Punch* perpetuated stereotypes of the Irish as coarse, potato-eating ne'er-do-wells. An editorial in the London *Times* declared that such louts deserved to starve. To the most cynical English, famine rid Ireland of criminals and overpopulation, a subtextual swipe at Catholicism for encouraging large families.

Realizing that their original measures were inadequate, English officials feared that resentment could fuel an Irish revolution. The government introduced a novel answer to mass hunger— nationwide famine relief. Agents directed relief stations on Ireland's streets, set up soup kitchens, and distributed staples to 3 million poor. Unfamiliar grains introduced corn bread to the Irish diet, just as the Filipino sweet potato had saved the Chinese from famine in 1594.

The era's most famous cook, Alexis Benoit Soyer, London's Reform Club chef, led volunteers to Ireland to set up innovative feeding programs. His model kitchen called for a mobile wood shed 200 feet (60 meters) long. With a steam boiler in its center, the shed held a 300-gallon (1,140-liter) cauldron and an oven at the far end. In addition, the makeshift refectory required cutting tables, chopping blocks, and condiment boxes attached to the roof supports. Soyer's kitchen closed in winter 1847 from lack of funds, then reopened in January 1848.

Meanwhile, world charities, spearheaded by a Quaker outreach, battled malnutrition along with deaths from exposure and epidemics of consumption, dysentery, pneumonia, and typhus. As of 1849, some 932,000 Irish smallholders still were unable to grow enough grain or vegetables for themselves. With mass emigration and the deaths of 1.1 million from hunger and disease, the island population fell to 6.5 million. Those who resettled in Canada and the eastern United States shifted their lifestyles from homeowners and farmers to that of a burgeoning class of servants and wage laborers.

China in the Twentieth Century

During the Great Leap Forward campaign of Chairman Mao Zedong, from 1958 to 1961, China endured a devastating famine that killed 45 million from deprivation, exposure, overwork, and violence. Bureaucratic meddling in farming forced deep plowing below topsoil and the planting of seedlings at six times the normal density. During a series of droughts and flooding of the Yellow River, the government failed to prepare for advancing malnutrition in eastern China. By summer 1958, despite communal kitchens and boarding kindergartens, peasants began to show nutritional strain. Yunnan farmers dropped dead from slaving over furnaces that reduced equipment to steel ingots. Beggars lined the highways.

While land productivity dropped by 15 percent, farmers adulterated grain by adding sand. Exporters slaughtered herds, leaving the Chinese virtually meatless. The unscrupulous resorted to stealing, smuggling, and torture. As China continued to export corn and sorghum to Africa and Cuba, Communist bureaucrats lost their positions for posting the true dearth of food. While corrupt managers allowed stock to rot and grain to lie unharvested, homeowners tore

their homes apart and traded bricks for staples. Women sold themselves for a meal. In Nanjing, half of violent crimes stemmed from disputes over food. The poor scrounged for roots, poisoned ponds to extract fish, swallowed mud, or committed suicide in despair.

Relief efforts and importation from the West in winter 1960–1961 fell short of need. Collective canteens doled out sustenance by the spoonful. At water conservation projects, laborers died of overwork and malnutrition as scheduled hours increased and food rationing reduced caloric intake. The store houses of Hebei and Henan remained closed to the poor. Szechuan Province reported a death rate of 14.3 percent; Guangshan County lost one-third of its population. World estimates of 20 to 43 million deaths swamped the official Communist Party count of 15 million. Charges against the regime claimed that Communists used selective genocide to rid the country of the disabled, elderly, and sick.

Africa in the Twenty-First Century

Into the twenty-first century, as predicted in 1984 by the Famine Early Warning System, food scarcity remained virulent in parts of postcolonial Africa. The Sahel, a 3,400-mile (5,500-kilometer) ecological band from Senegal and southern Mauritania east to Eritrea, Ethiopia, Kenya, Somalia, and Sudan, provided too little sustenance from grasslands and savannas for a burgeoning population. Mounting desertification stripped pastures of grass and robbed forests of combustibles for cooking fires.

On January 1, 2010, the International Food Policy Research Institute predicted that environmental degradation and water mismanagement could reduce sustainability of fragile lands in Burkina Faso, Chad, and Niger. Farmers diverted fields from cassava and wheat to export-for-cash commodities such as peanuts, sesame, and shea nuts. Medair, a Swiss-based relief agency, examined the lack of produce in Sudan and found 46 percent of its children starving. Hunger forced families to migrate from country to country, such as the male villagers of Gueza, Niger, working in Nigeria. Diasporas increased mob violence north and south of the Sahel. In response, the Emergency Food Security and Rural Development Programme identified and aided the most vulnerable farm families, strengthening

irrigation and crop transportation for rice and wheat.

As heat waves and dust storms compromised farming and tropical rains shifted to the south, the drought of June 2010 destroyed Nigerian crops and pastures, putting 1.2 million at risk of starvation. Hydrologists studied ancient aquifers for sources of water for wells to return the Sahel to agriculture and pasturage. Appeals to global charities directed concerns toward child mortality in Chad and Niger, but abduction and banditry throughout the Sahel threatened the aid workers who investigated. To reduce chancy overland deliveries, the United Nations employed C-130 transport planes to deliver sacks of rice to Rumbak, Sudan.

Despite various dangers, relief work continued. The International Fund for Agricultural Development loaned farmers cash for seeds and cereal for immediate famine relief; farm families repaid the loans with cereal from subsequent harvests. Doctors Without Borders measured children's arms to test for muscle atrophy and set up therapeutic feeding programs offering supplemental rations. Desperate cases required hospitalization at Magaria, which saw 6,200 starving children within the first six weeks of 2011. UNICEF delivered a free spread called Plumpy'Nut at 204 feeding stations in Niger to improve nutrition for children.

In February 2011, the London media warned that the Sahel suffered from "virtual kleptocracies," the theft of food by despots and warlords, but lauded the rising revenue from Kenya's Green Belt movement and foreign investment by such conglomerates as Coca-Cola, Kentucky Fried Chicken, and Walmart. The locus of 60 percent of the world's uncultivated arable land, Africa, according to pundits, could surprise the world by controlling cyclical disasters through bioengineering that boosts profits from coffee, corn, millet, peanuts, and sesame.

See also: Agriculture; Caching; Famine Relief; Jacobean Diet and Cuisine; Linnaeus, Carolus; Malnutrition; Manioc; Plant Disease and Prevention; Potatoes; Standish, Miles.

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[Famine Relief](#)

A group effort to rescue victims of starvation, famine relief recurs in history during upheavals that threaten regions with malnourishment and death, especially for vulnerable children and the elderly. Famine presents a moral dilemma by victimizing people who live in chronic poverty. Without access to transportation from war, harvest failure, and natural disasters, the poor struggle with inadequate food supplies under worsening conditions, such as lack of shelter and sanitation and advancing epidemics.

Global famine raises questions about the nature of charity and responsibility to the unfortunate. According to Australian bioethicist Peter Singer's essay "Famine, Affluence, and Morality" (1971), privileged nations have an obligation to relieve suffering, even at a high cost to donors. In 1996, New York philosopher Peter K. Unger defended Singer's premise in the ethical treatise *Living High and Letting Die: Our Illusion of Innocence*.

Essential to relief efforts, early warning systems avert or ameliorate disaster, such as that suffered in colonial Vietnam after 1862 and during the Russian famine of 1919–1922, the Sahelian famine of 1973, and hunger in drought-stricken Darfur, Sudan, in 1984–1985. Long-range assistance aims to sustain starving people temporarily until they can regroup, reap a sufficient harvest, and plot autonomous subsistence for the future. The emergency aid to Cambodia in 1975 and 1979 rescued refugees displaced by tyranny and mass killings under Pol Pot and the Khmer Rouge. In the largest food, seed, fertilizer, and tool distribution effort to date, the combined efforts of CARE and UNICEF on the Cambodia-Thailand border fed 25,000 people a day, handing out supplies of 22 to 66 pounds

(10 to 30 kilograms) of rice. Out of the original population of 8 million Cambodians, over the next two decades, the 66 percent who survived reinvigorated the agrarian strengths of Southeast Asia's rice bowl.

Aid to the suffering is an essential of urban planning. As a proactive measure, Chinese engineers protect low-lying rice beds and wheat fields by maintaining a watch on flood conditions. If famine threatens from harvest failure in sodden fields, food wardens distribute food free to the needy. During the Ming dynasty (1368–1644), philanthropists protected the lower Yangtze River valley and the food security of central and southern China. In 1644, the Manchus ensured agrarian abundance by improving efficiency of flood control and grain storage. The proficiency of these measures raised China's standard of living to unprecedented peace and prosperity for 300 million people.

Because of a political ideology that set state intervention policy, the Chinese led world theoreticians in studying protracted food scarcities. State leaders applied Confucian beliefs in *tao* (the way) to prevent mortality: Official granaries stockpiled grain when prices were low and sold it during inflationary periods to stabilize food costs. In the 1700s, the Qing emperors entered the golden age of famine relief, the result of years of preventing food scarcity via realistic methods of predicting weather catastrophes and gauging the human ability to endure urgent shortfalls.

In addition to plotting supply and demand, distributive justice requires control of opposing dynamics. The thwarting of clan wars, genocide, population displacement, food speculators, tyrants, and hoarders ensures that nourishment arrives at the right place with minimal waste. Another problem with aid delivery, the marginalizing of female farmers, who grow up to 80 percent of food in developing countries, removes from the relief equation people who can provide supplies directly to resolve crisis situations.



A Turkana native carries food aid from a relief distribution center in northwest Kenya in 2011, when a drought across East Africa threatened famine for more than 13 million people. Humanitarian agencies raised over \$1 billion in aid—still not enough. (Stringer/AFP/Getty Images)

Widespread combat raises complex obstacles based on national loyalties. Bengali philosopher Amartya Sen issued warnings about food insecurity in *Poverty and Famines: An Essay on Entitlement and Deprivation* (1981), a study of the 1943 Bengal famine, which occurred in the midst of World War II. He blamed price gouging, panic buying, warehousing, war time inflation, and military provisioning for driving prices beyond the reach of rural laborers. Even though food production remained high, victims had no means to buy it.

Benevolence to famine victims requires logistics, as in the case of food shipments to northern India in the 1960s, which slowed because of inadequate port facilities. In 1969, Frederick C. Cuny, an engineer and urban planner from New Haven, Connecticut, initiated a career in such humanitarian relief efforts as food distribution and water purification projects, beginning with hands-on work with migrant farm laborers in Kingsville, Texas. As a United Nations agent and the founder of Intertect Institute, a private relief agency headquartered in Dallas, Texas, Cuny instituted technical assistance with minimum delay to the needy in

Biafra, Bosnia, Cambodia, Ethiopia, Guatemala, India, Iraq, Kurdistan, Mexico, Somalia, and Thailand.

Cuny's pilots—veterans of the Korean and Vietnam wars, mercenaries, Israelis, and Air America pilots— delivered food packets dispatched by CARE, Inter-Church Aid, and the Red Cross. Crews paved roads to speed aid trucks, repaired gas lines to fuel stoves, distributed vegetable seeds for windowbox gardens, restocked herds, and set up sanitation facilities to prevent disease. While negotiating a cease-fire in Chechnya in April 1995, Cuny disappeared, possibly executed by Chechen rebels in Bamut. His legacy survives in the Cuny Center of Arlington, Virginia, founded in 2002 to expedite disaster relief with practical solutions.

See also: Airlifts, Food; Charlemagne; Famine; International Food Aid; Jiménez de Quesada, Gonzalo; Malnutrition; Maritime Trade Routes; Potatoes; Soyer, Alexis; Taro.

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[Farm Subsidies and Government Agricultural Programs](#)

Governmental assistance to farmers supplements agrarian income while regulating the supply of commodities to prevent surpluses and drops in food prices. In the United States before the Great Depression, the 1922 Grain Futures Act shielded the heartland from price instability, primarily in corn, cotton, dairy, peanuts, rice, soybeans, sugar, vegetable oil, and wheat. In 1929, the Agricultural Marketing Act, followed in 1933 by the Agricultural Adjustment Act, set the tone and style of New Deal protectionism, which guaranteed price floors by warehousing surplus food. As a result, the protectionism from supplemental payments rid farming of market competition.

The effort failed to halt falling prices and did little to aid some 8.5 million tenant farmers and sharecroppers in Alabama, Arkansas, Mississippi, Missouri, and Tennessee. Representing the bottom of the agrarian realm, these serflike farmers lived at the mercy of landlords. The loss of income from cotton, hay, and rice and the violence instigated by landowners left some farm families homeless and jobless. Payments to landowners enabled them to purchase farm machinery that further displaced poor laborers.

Money for Not Planting

A novel approach in May 1933, the Agricultural Adjustment Act, the first modern U.S. farm bill, paid farmers for not planting and for slaughtering excess livestock to avoid food surpluses. In the midst of World War II, President Franklin D. Roosevelt warned that lowering price supports could boost living costs and inflation. Wrangling in the postwar years forced President Harry S. Truman to maintain subsidies and President Dwight D. Eisenhower to pledge administrative support for flexible price aid based on land productivity.

American farmers profited from demand in 1972, when crop failures in the Soviet Union spiked the market for wheat. As a result, subsidies fell to their lowest point at 2 percent of total farm income. The picture shifted in 1985, when farm financial crises spawned Farm Aid concerts to protect rural families from bankruptcy. A peak in agricultural research in 1994 generated ideas for genetic modification and livestock breeding. Scientific support increased yield to solve the developing world's population growth and demand for more food, notably in

China.

Twenty-First Century

By 2000, U.S. farm protectionism averaged 47 percent of total agrarian income. Five years later, the World Trade Organization warned the United States that North American subsidies competed unfairly with world food production and pricing. Disparities forced developing nations further into poverty and food dependency. A similar aid system in Canada shielded farmers with tariffs on cheese, chicken, eggs, and milk at the rate of \$8 billion a year.

From 2002 to 2007, U.S. crop subsidies altered from fixed remuneration for market losses to the flexible payments originally proposed by President Eisenhower. After the May 2002 Farm Security and Rural Investment Act boosted payments to \$16.5 billion per year, loan deficiency payments, irrigation and export credits, and marketing loan guarantees supported production of cotton, dairy, feed grain, honey, oilseed, peanuts, rice, soybeans, sugar, tobacco, vegetable oil, and wheat. The bill raised the guaranteed wheat price to \$3.92 per bushel, plus a Food and Drug Administration payout of \$.52. Opponents of the Farm Act complained that payments of \$180 billion to farmers enlarged the subsidy program by 70 percent and generated feedlot situations requiring antibiotics to combat *Escherichia coli* (*E. coli*). The World Trade Organization proclaimed the subsidies an obstacle to fair trade.

Unsold corn following Hurricane Katrina and the scramble for fossil fuel alternatives in 2005 elevated payments for corn to \$7.3 billion per year for the production of ethanol. By 2009, 62 percent of U.S. farm earnings— \$180.9 billion— came from the government. The majority of receivers resided in Texas, Iowa, and Illinois on commercial farms. Only 9 percent remunerated rural residence operations.

Alternatives

Global opinions of farm protectionism fluctuated according to circumstances. In 1984, New Zealand farmers stopped receiving financial aid, as economic

authorities sought to control overproduction and inflated land costs by alleviating market controls on food exports. Surprisingly, as New Zealanders reduced production of surplus fatty sheep and turned to viticulture (the cultivation of grapes) and pasturage for feeding cattle that produce milk higher in protein and lower in butterfat, farm prices rose 40 percent and bankruptcies failed to materialize for all but 1 percent of New Zealand farmers.

As contrasted with U.S. subsidies, which compose 22 percent of the value of agrarian produce, New Zealand provided only 1 percent in farm aid, which applied only to agricultural research. The loss of regular payments in New Zealand and reduced subsidies in Australia forced suppliers of fertilizer, implements, and seed to reduce their profiteering. To meet market demand, dairy farmers explored future markets for kosher and antibody-rich milk and chocolate cheese.

Restructured Protectionism

Beginning in 2006, Malawi distributed vouchers to corn, rice, and tobacco growers to reduce the financial burden of seed and fertilizer by some 33 percent. Although the country became self-sufficient, opponents termed the Malawi model a short-term gain promising eventual disaster. The United States clung to its 90-year subsidy program, which enabled multinational corporations to dump surpluses on the world market. Surpluses forced rising deficits on poor farmers in sub-Saharan Benin, Burkina Faso, and Mali and suppressed conservation methods — biodiversity, sustainable cropping, wildlife protection, and regeneration of ecosystems. Tariffs and the incentives systems in Japan and the United States ensured high food prices, such as those for Brazilian cane sugar, as well as poverty among vulnerable smallholders in such nations as Angola, India, and Nigeria.

Because world cotton, dairy, and sugar prices tumbled in 2009, the United Kingdom and the United States restored subsidies and erected barriers to free trade with Australia and New Zealand. Health providers blamed the low cost of sweet drinks and fattening snack foods, as opposed to the higher cost of healthy staples, for contributing to an obesity epidemic. In 2010, while the European

Union subsidized agribusiness and fisheries, U.S. authorities pondered setting a cap on direct payments to farmers earning less than \$750,000. The proposal acknowledged that farm households earned \$77,654, or 17 percent more than the average family, from a form of government welfare.

In August 2011, economic instability, increasing exports of pork and soybeans to China, and a boom in milk and grain prices forced U.S. politicians to consider scrapping the Depression-era subsidy initiative. European farm programs faced cuts in Belgium, where the European Union set a cap on aid to limit profits to large agro-industrial corporations. Protectors of farm aid feared a complete loss of the safety net. Britain's National Farmer's Union predicted that caps would endanger some 800 farms. Some warned that dependence on foreign food imports subjects buyers to lower crop quality and sanitation standards as well as potential unmonitored genetic modification of livestock and seed.

See also: Agriculture; Cereal; Lunch.

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Farmer's Markets

See Local Food Movement

Fast Food

Quick-serve meals have appealed to consumers, shoppers, soldiers, and travelers from ancient times. Street fare historically caters to the hurried diner. In 1700 B.C.E., the brick counter at Ur stocked bread and spitted meats grilled on charcoal braziers, an early model of convenience food. According to the Greek historian Herodotus and travel writer Marco Polo, the world's first fast food began with curdled koumiss (or *kumish*), a mare's milk refresher originally fermented by the Scythians. In Ostia, Pompeii, and Rome, citizens of the Roman Republic and subsequent Empire had their own version of handy takeout at open-air cafes, where hawkers recommended stew with side dishes of chickpea fritters and olives served with wine.

In the Middle Ages, sailors and strollers took advantage of crepes, curry, flatbread, pancakes, and pasties cooked in the commercial districts of London, Paris, and Venice. Near ports, outdoor cooks steamed rice cakes and grilled kebabs and oysters. The pilgrim march through Santiago de Compostela in northern Spain demanded wine restoratives, which barkeeps sold with fried cakes dipped in honey retrieved from rock crevices. In the Yangtze River delta of China, street cooks in the market town of Shanghai offered bowls of noodles and fried dumplings with tofu. Complaints about culinary chicanery and shoddy preparation resulted in laws protecting buyers from such trickery as carp roe sold as sturgeon caviar and the heavy peppering of goat meat to conceal spoilage.

Urban Fare

The Renaissance strengthened the urban demand for street eats, from calzone in Italy to honey nut pastries in Morocco. Vendors cooked at plazas to the specifications of purchasers, such as roasting meat tidbits with vinegar sauce and marking *gaufres* (waffles) with the Chi-Rho or cross on Christian holidays. In India in the 1500s, *dosas* consisted of fermented dal-and-rice crepes, a popular quick hot snack served with coriander or tamarind chutney. Street cooks in the Middle East offered grilled eggplant and sardines and almond and sesame sweets. After 1519, Spanish conquerors of Mesoamerica found the food court of

Montezuma II offering seafood empanadas. The 1600s introduced military dinner wagons and sutlers' barrows, which served hot fare to forces maintaining sieges around city walls.



A Greek street vendor slices meat from a rotisserie to serve in a gyro—a pita pocket with roasted meat onion, tomato, and *tzatziki* (yogurt sauce). A centuriesold fast food, the gyro is a close relative of the Arab shawarma and the Turkish doner kebab. (Michael Gottschalk/AFP/Getty Images)

In the 1800s, Thailand produced its canal-side fast food in Bangkok with *khao pad* (fried rice) and pad thai (noodles with eggs and vegetables). In 1867, Charles Feltman, a German American entrepreneur, introduced the hot dog on a bun, served from his charcoal-heated cart at the amusement park at Coney Island, New York. The concept translated into rapid sales at the 1893 World's Columbian Exposition in Chicago and the 1904 Louisiana Purchase Exposition in St. Louis. From fair venues, individual vendors equipped self-contained hot dog carts and wienie vans, modeled on the Western chuck wagon.

A satisfying comfort dish and fast food on the American frontier, chili con carne thrived at Military Plaza Mercado between San Antonio's city hall and San Fernando Cathedral from the 1880s. Latina women let the aroma of cayenne and chili powder lure late-evening traffic to pots of chili heated over charcoal and mesquite flame. At La Plaza del Chile con Carne, a dime bowl and a tortilla

served shoppers, soldiers, and wranglers. Public health concerns regarding the washing and reusing of bowls resulted in the closure of the impromptu chili business.

Early-twentieth-century Reform Judaism abandoned kosher rules, which tended to isolate Jews from fast-food restaurants, a common element of mainstream society. Jews felt exonerated for purchasing cheese pizza in Naples, doner kebabs in Halifax, gyros in Athens, and *poulet-crudités* (chicken and vegetables) in baguettes on the French Riviera. For fast food in Israel, snackers chose falafel, fried chickpea croquettes in pita, a national craze. In 1912 in Leeds, England, Harry Ramsden opened a fast-food business in fish and chips, a British favorite since 1860. As the result of a dearth of cod, British fish-and-chips shops later began dispensing dogfish, haddock, hake, plaice, and skate in the standard quick-serve dish.

The Age of Hurry Up

In the United States, impatient drivers began patronizing gas-station convenience stores that stocked sandwiches and nachos. Teens with cars promoted fast-food franchising, which began with A&W Root Beer in 1919, a roller-skating curb service in Lodi, California, and White Castle burgers two years later in Wichita, Kansas. By 1925, Howard Deering Johnson raised the cachet of hurried meals by opening Howard Johnson's, or "HoJos," the first standardized ready-serve dinners and ice creams in Quincy, Massachusetts. In 1932, the opening of Krystal in Chattanooga, Tennessee, marketed the slider, a low-price burger, sold with coffee for 35 cents. In British Columbia, Carl Karcher initiated Canadian fast food in 1941 with Carl's Jr., a drive-in barbecue. Mobile army canteens during World War II brought Allied infantrymen face to face with female servers in hard hats distributing doughnuts, sandwiches, and tea.

For the Western world, the evening dinner hour defined house hold timeliness and togetherness until the late 1940s. Families began abandoning seven-day-a-week rituals for five-day-a-week home meals and weekend runs for burgers and fries and fried chicken and fish. Food on demand demolished dining timetables. Snacks randomized hunger and fulfillment. Meals on demand diminished the

camaraderie of the nuclear family while dulling the expectations of consumers for a wide array of flavors and food combinations and the pleasure of conversation and table courtesy.

In the 1950s, the growth of fast food standardized eating out of hand buns and rolls with meaty fillings and of chicken legs, fish sticks, fried pies, and kebabs, as well as egg rolls from Jack in the Box in San Diego in 1951 and “value combos” at Burger Chef in Indianapolis in 1954. In 1956, a year after Ray Kroc opened his first McDonald’s franchise in Des Plaines, Illinois, and three years after the opening of Burger King in Jacksonville, Florida, Charles Woodrow Pappé and Troy Nuel Smith revamped the skating carhops at the Sonic Drive-in, a burger stand that opened in Woodward, Oklahoma. In midcentury, fast food grew faster than formal restaurants. Drive-throughs degraded the waiter-diner relationship with industrialized food service. Fast-paced kitchens depended on automation to time the frying of potatoes in wire baskets and the squirting of soft-serve cream into cups and lowered the quality of ingredients and commercial cooking skills to monotonous minimum-wage jobs.

The mushrooming of franchises began with Hardee’s in St. Louis in 1960 and extended to Subway in 1965 in New York City, Roy Rogers in Frederick, Maryland, in 1968, and Wendy’s in Columbus, Ohio, a year later. Papa John’s Pizza joined the competition in 1983 in Jeffersonville, Indiana. Minority communities sprouted chicken takeout sites labeled Bojangles, Church’s, and Popeyes, venues of unhealthy fried food that encouraged obesity and declining health among the poor.

The industry continued to spread in the early twenty-first century. In 2000 in Brazil and Mexico, Alberto Saraiva, owner of Habib’s, introduced open-faced Lebanese meat pies as fast food. The fast-food model influenced hospital and school cafeterias to replace a broad meal plan with french fries, hamburgers, and pizza. In addition to assaults on child nutrition, the fallout from paper, plastic, and Styrofoam wrappings and utensils forced civic authorities to combat roadside litter.

In 2000, the Vegetarian Legal Action Network petitioned the Food and Drug Administration to mandate that all fast-food giants label flavorings and preservatives. Activists from People for the Ethical Treatment of Animals focused on unnecessary animal suffering in abattoirs. Reformers denounced the food mill

approach to animal husbandry and targeted Burger King and McDonald's fast-food restaurants in Miami to protest large-scale slaughter of cattle to feed a voracious public.

Public demand for lower trans fats forced the reformulation of quick snacks and finger food processed in oil at high temperatures. Companies reducing trans fats included Arby's, Burger King, Chick-fil-A, Kentucky Fried Chicken, McDonald's, Taco Bell, Walt Disney Company, and Wendy's. Erich Schlosser's 2001 best-selling book *Fast Food Nation: The Dark Side of the All-American Meal* (2001), Scott Ingram's *Want Fries with That? Obesity and the Supersizing of America* (2005), and Morgan Spurlock's documentary film *Super Size Me* (2004) attacked the American quickie diet for children. In the wake of public pressure, as of July 2008, New York City banned trans fats from all restaurants.

Currently in Africa and Asia, up to 50 percent of urban food purchasing occurs at fast-food venues. Hurry-up meals offer outlets for female entrepreneurs, who assemble Third World kitchen businesses from home experience and such local ingredients as peanuts and yams. Street food remains a bargain for homeless and low-income patrons, who rely on mobile dim sum and dumpling bars and falafel and taco stands rather than equip and stock a home kitchen. Liabilities to depending on fast food range from undependable service and traffic congestion to contaminated water, high-calorie choices, and unrefrigerated perishables breeding *Escherichia coli* (*E. coli*) and salmonella microbes. Despite the negative impact on diet, American convenience food fans in October 2011 concurred with Yum! Brands—Kentucky Fried Chicken, Long John Silver, Pizza Hut, and Taco Bell—in demanding that federal food stamps apply to takeout meals.

See also: Carbonation and Carbonated Beverages; Chili; Kebabs; McDonald's; Soft Drinks and Juices; Street Food; Trans Fat.

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Feasting

In folklore everywhere throughout history, the banquet table represents a gustatory and social welcome as well as honor for important people and special days. In the oldest extant hero tale, the *Epic of Gilgamesh*, episodes from around 2600 B.C.E. saluted an urban Mesopotamian civilization. The vintner Siduri urged Gilgamesh to feast among good company and good food as a way to enjoy life at its fulest. For Mesopotamians, around 2500 B.C.E., feasting was a communal experience, whether celebrating a cult or wedding or reverencing the spirit of the dead. For maximum demographic inclusion, hosts paid tribute to a king or dignitary and also fed the poor. In Turkey, generous hosts traditionally displayed their hospitality with the *dastarkhan* (great spread), a festive table topped with abundant and varied dishes to treat the guest of honor. At the other end of the Mediterranean, the Moroccan *diffa* (banquet) welcomed pilgrims from a journey to Mecca with cushioned divans and dishes of bean dip, lamb brains, meat tagines, and delicate salads served with fruit juice.

Records of ancient dining picture feasts in mural and verse. In Egypt around 1450 B.C.E., tomb art depicted grand wining and dining as a time for a varied menu and flowers to adorn guests. Royalty established its sophistication by staffing a well-run kitchen and coordinating dizzying arrays of appetizers and main courses. To create ambience, servants assisted diners in hand washing and offered fragrant unguents. In the Hittite tradition of ancient Anatolia (present-day Turkey), from 1460 to 1180 B.C.E., propitiation of gods at feasts, military thanksgivings, and state cult ceremonies included Hurrian or Mesopotamian blessings on royal brides and grooms, oaths of devotion, and chants accompanying libations and sacrifices of oxen on holy altars.

In India, conspicuous consumption of luxury foods contrasted with the dietetic

concerns of the health conscious for Ayurvedic regimens, which date to 1500 B.C.E. The compilation of ecstatic Hindu banqueting verse in the Rig Veda resulted in a unique hymnal, the *Sama Veda* (*Chant Lore*, 1000 B.C.E.), a collection of 1,549 liturgical poems, table invocations to Indra, the lord of heaven, and feasting and tippling melodies. At the soma sacrifice, guests passed platters of rice and sour curds blended with barley and served with ghee (clarified butter). At the height of a ram sacrifice, cooks diced the meat and added flour before shaping the mix into meatballs. The sacred repast concluded with cakes made with butter and sugar or molasses and quaffs of soma, which songs declared nourishing, sparkling, and spiritually purifying.

Feasting as Fellowship

Unlike Hindu religious opportunities for dining, ancient Greek feasting, such as Alcinous's welcome to Odysseus in Phaeacia in Homer's *Odyssey* (ca. 800 B.C.E.), stressed fellowship in the prefix *syn-* (together)—as in *symposion* (drinking together) and *syssition* (dining together) with a *syndiepnos* (table companion). The concept of company in Crete and Sparta overrode other motivations for the simple hearth meal and for the generous spread, including the table topped with dishes contributed by community members. At major gatherings known as Dionysia, honoring cultivation of vines, and the Panathenaea, a grand celebration of the goddess Athena, citizens judged each other on the basis of public and private hospitality around the sacred fire. To valorize the idea of sharing food in a peaceful atmosphere, diners revered Demeter with gifts of grain and presented wine to Dionysus. Regard for the two deities of nature's bounty strengthened the social virtues of humility, altruism, and civility.

For Greek men during the classical era, the feast—whether for relaxation and serious discussions, the welcome of foreign envoys, or client promotion—extended an opportunity to accentuate male values. In Homer's *Iliad* (ca. 800 B.C.E.), grief for the death of Patroclus in battle took the form of a congenial man's meal of spit-roasted meat of a goat, ox, sheep, and swine. In soldierly style, the Greeks ate on the ground around the fireside without plates or utensils. They joined in postdinner athletic competitions, which ended with prizes—armaments,

a tripod, a silver urn, and female slaves.

For some banquets, slaves delivered oral invitations. Neatly dressed guests removed their sandals and reclined on dining couches alone or in twos. While leaning on the left elbow, the diner selected finger foods from platters or scooped vegetable *mélanges* or meat stew with bread. Slaves removed individual tables and brought in new ones with the next course. Guests shared meat sacrificed and flame-broiled on the altar before sharing loving cups of watered wine, a gesture of restraint. Music and *entremets* (entertainment between courses) preceded *kottabos*, the game of flinging wine residue from a chalice toward a target. The feast concluded with welcome to *hetaerae*, sophisticated courtesans, often foreigners admired for their exotic looks, dress, and makeup.

Republican Rome imitated the Greek symposion and personalized it as a *convivium*, a private dinner party served at groups of three couches forming the *triclinium*. The aspiring aristocrat or nouveau riche cultivated their social superiors with status-defining hospitality. Both men and their wives or mistresses received invitations and, in some cases, a list of table topics to discuss at the event. Additional female company ranged from lute players and singers to stage performers, acrobats, and dancers. Wait staff extended welcome at the door and removed guests' sandals. Dinner began with a formal invocation to the gods. The service of from three to seven courses and the after-dinner drinking could last from mid-afternoon to early morning. Complex combinations of flavors and textures teased participants to guess the secret ingredient and prompted them to vie for employment of freelance cooks and pastry chefs.

The Orderly Table

Into the mid-600s, Arab notables dined on exotic or bizarre wild foods from Africa. They congratulated themselves that high birth and wealth allowed them to avoid the coarse, meager, and repulsive fare of Bedouins, their social inferiors, who survived on hunting and gathering. The Ghassanids of southern Arabia, the self-ordained "Sons of the Large Platter," competed with each other for service of the most arcane recipes, some of which travelers imported from Byzantium. Presentation of the best *huwwara* (white bread) with clarified butter, honey, and

olives preceded boiled camel or goat cooked in sour milk, broiled mutton, or gazelle haunches, a male favorite for their proof of a successful hunt.

The dissemination of rice, sugar, and other food crops varied the Islamic diet from dates, milk, and the meat of camels, goats, and sheep to more varied dishes available in public markets and private homes. The elite favored banquet entrées of birds, fish, kid, and lamb and perfumed condiments gilded with saffron. Persian historiographer Firdawsi won world acclaim for his dynastic epic *Shahnameh* (*The Book of Kings*, ca. 1010), which balanced sober laws and moralizing with commentary on status dining, wine sharing, royal coronations, and Zoroastrian feasts that spread merriment throughout the Persian court. Feasters anticipated almond paste candies, pies and sweet biscuits, puddings, pistachio nuts, an after-dinner coffee flavored with cardamom pods, and an array of nonalcoholic fruit drinks pressed from blackberries, dates, grapes, pomegranates, and raisins and flavored with honey. Camphor, musk, and rosewater added beguiling scents.

According to Islamic courtly art and the travel memoir of Ibn Battuta, *Tuhfat al-Nuzzar fi Ghara'ib al-Amsar wa'Ajaib al'Asfar* (*On Curiosities of Cities and Wonders of Travel*, 1354), late-medieval Arab dining at At'izz followed a regimented social order. Two types of catering acknowledged hierarchy with an abundance of food to accommodate unexpected guests. Seating placed the sultan among advisers, sharifs, judges, and other guests, who ate from the primary dishes. The rest of the company—sheikhs, emirs, and military officers—chose from secondary servings. On the Night of the Bonfires each November, residents of Baghdad spread banquet tables along the Tigris River and drew the caliph's barge at the head of a boat procession. Dining, camp-side tea, and bonfires lasted all night.

In other cultures, placement of invitees impacted the political and social intent of upscale feasting. The Chinese seated their guests of honor with backs to the wall, thereby providing a commanding glimpse of other tables and ensuring safety from assassins. The organization of entrées from cold jellyfish noodles, lotus root, and thousand-year-old eggs preceded such hot dishes as dumplings, eels and prawns, mitten crabs, roast duck, and soups. Cups of tea cleansed the mouth between courses.

In Europe, the seating of guests above and below the salt indicated political

and social relationships with the laureates at the head table. A sign of largesse, the procession of wait staff bearing a whole roast pig to the table made presentation of the entrée the height of the celebration. Service of meat slices on trenchers, thin layers of crustless bread, soaked up natural juices like present-day bread bowls. After waiters cleared the table, they distributed trenchers to the poor who clustered outside.

Displays of Plenty

The Renaissance set European event planners on the trail of the most glamorous table settings and unusual entrées matched with the appropriate aperitifs, wines, and cordials. In the 1450s, readers of the classics revived the ambience of the Roman villa in the *sala* (reception hall) and the *triclinium*. Colored jellies, parmesan cheese, and sausage replaced roast peacock and swan. Banquet literature recorded enticing scents of cinnamon, clove, and ginger and the prominent positioning of marzipan table scenes, rosewater fountains, silvered swans, edible table favors, fruit cascades and pyramids, and tarts gilded with gold leaf. Amid the usual table greens, the era's sweets craze added rococo sugar sculptures and sugar ribbons and plaques, often perched on mirrors amid flickering tapers for maximum display.

To the French court of Henry II, Queen Catherine de Médici ferried north with her trousseau the basics of the Italian *banchetto*, the theatrical dining stage essential to the power-hungry Estes, Gonzagas, Sforzas, and Urbinos. She elevated the artichoke and asparagus as royal vegetables and introduced the gratin, a cheese-topped casserole toasted to a bubbly brown crust. Carvers added elegance to the slicing and plating of roast pork and veal, which bearers carried whole to the carving board. For a diversion, the knowledgeable chef presented oysters and shellfish; capons, guinea hens, partridges, pheasants, pigeons, or turkeys; or seafood, birds, and meats lighter in flavor and devoid of the heavy layers of fat in the medieval ox. Easier to manage on the recently introduced ceramic plate and faience dish, such wild fare posed in the well of a bordered expanse amid their natural juices.

A practical means of distributing solids with sauces, premodern tableware

enabled guests to display delicate table manners and the flair of the new utensil, the Italian dinner fork. The restoration of Charles II to England's throne in 1660 reinstated the ritual gala, at which royalty and courtiers dined at public feast tables while their subjects watched in silence. The house-proud, after 1755, flaunted the permanent *salle à manger* (dining room).

In premodern Japan at feasts for aristocrats, shoguns, and high-ranking samurai, the appearance and significance of delicacies outweighed the importance of consumption. The *shikibocho* (knife ceremony) displayed skillful disjointing, filleting, and sectioning of fish, duck, and quail. Plates of ceremonial snacks provided artfully arranged fruits and vegetables shaped like flowers or in geometric designs for guests to admire and compliment as well as tidbits to carry home. Diners anticipated the *shiki-sankon*, a series of nine rounds of sake poured into thimble-sized cups and hoisted to friendship and courtesy. Between rounds, guests consumed snacks of abalone, dried chestnuts or squid, pickled apricots, or seaweed. Each serving bore symbolic value as tokens of military glory and prosperity. In the 1500s, restrained guests at wedding feasts pretended to devour these totemic foods, then tucked them discreetly into a pocket or kimono sleeve. The hosts concluded elaborate displays of food platters with thick tea and tea sweets, a final tray of chestnuts, rice cakes, and yams.

In Britain, the coronation of Edward VII in August 1902 ended an era of meal rituals and table splendor called *cuisine classique*. The onset of World War II decimated Victorian below-stairs kitchen staffs; a world depression terminated such opulence as fruit cornucopias shaped in ice. The technology of food preservation, refrigeration, and global delivery of exotic and out-of-season foods such as asparagus, citrus fruit, and strawberries sapped menus of their surprise. Restaurants further dampened enthusiasm for the state banquet by offering local dining in Cajun, Cantonese, Indian, Libyan, Malaysian, and Szechuan fare. Hollywood film and television convinced men and women that light dining and sensible portions could slim the body and extend youth and longevity.

On October 12–16, 1971, Reza Pahlavi, the shah of Iran, recalled the splendors of ancient Asia by hosting an elaborate international celebration of the 2,500th anniversary of the Persian Empire. Coordinated for ten years at a cost of \$200 million, the event took place at Persepolis, the capital city since 550 B.C.E., and commemorated the historical link between the shah and Cyrus the Great. A vast

tent city welcomed 600 dignitaries to a sumptuous menu, orchestrated by Chez Maxim's of Paris and served on Baccarat glassware and Limoges china, the result of the collaboration of 160 bakers, chefs, and waiters.

For the birthday of the queen, Farah Pahlavi, on October 14, waiters arranged a serpentine table to hold caviar-stuffed quail eggs, crayfish mousse, lamb with truffles, and foie gras-stuffed roast peacock, Iran's national bird. The banquet, highlighted by 25,000 bottles of wine, concluded with champagne sorbet, figs in raspberry cream, mocha coffee, and cognac. Dining extended more than five and one-half hours, a world record for modern times.

See also: Athenaeus; Egyptian Diet and Cuisine, Ancient; Greek Diet and Cuisine, Ancient; Japanese Diet and Cuisine; Luau; Médiçi, Catherine de'; Persian Diet and Cuisine; Roman Diet and Cuisine, Ancient.

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Fermented Foods

While extending the use of foods, fermentation enriches cuisine with varied flavors, hues, scents, and textures in alcohol, bread, cheese, pickles, sausage, vinegar, and wine. The chemical phenomenon that converts carbohydrates into acids or alcohols transforms staples in all parts of the diet—beans into miso and soy sauce, cassava into silage and Indonesian *tape*, cocoa pods into chocolate, corn into posole and smut, herbs into sarsaparilla, milk into curds and yogurt,

peanuts into Javanese *oncom*, potatoes into baker's yeast, rice into *arroz amarillo* (yellow rice), tea into *kombucha* and semi-fermented oolong, and vegetables into black bean sauce, breadfruit loaves, and cucumber and walnut pickles.

Historically, meat made unique alterations under enzymatic action: fish into *garum* (fish sauce) and Norwegian *rakfisk*, pork into chorizo and pepperoni, and shrimp into Indonesian *blachan* (shrimp paste). Alcoholic drinks derived from a wide range of ingredients—beer from barley or wheat and honey, brandy and cider from cherries or peaches and apples, Celtic mead and metheglyn from honey, koumiss from mare's milk, Macedonian *baza* beer from millet, *pulque* from agave and corn, rum from cane sugar and cassava, sake from rice, and vodka from potatoes.

The distinctive colors and tastes that evolved over time generated ethnic specialties as closely linked to cultures as Chinese tofu, Filipino mango and papaya pickles, German sauerkraut, Greek green olives, Hawaiian *poi*, Himalayan smoked yak, Indian ghee and *shrikhand* (sweetened sour cream), Irish whiskey, Italian capers and salami, Korean *kimchi* (pickled Chinese cabbage), and Nigerian *fufu*.

From as early as 10,000 B.C.E. in China, Libya, and the Near East, some four millennia before the invention of earthenware storage containers, food preparers altered and preserved natural resources through incidental biotransformation, such as the fermentation of cow's milk by Libyans in 9000 B.C.E. The Egyptians began baking flatbread in the ninth millennium B.C.E. In 1500 B.C.E., two millennia after they brewed the first barley beer, they leavened bread to produce a lighter, tastier crumb than flatbread. By mixing risen dough with new batches, bakers perpetuated the formation of sourdough from the action of carbon dioxide and ethanol from soured milk on flour and water. As risen loaves came into demand, bakers formed their own manufacturing guilds, which concealed each group's fermentation methods and kneading and rising secrets.

From bacteria, filamentous mold, lactic acid, and yeast, raw and cooked dishes acquired new qualities and improved food safety and nutrition, natural assets of preservation. Via inadvertent chemical changes in unpreserved dough, fruit juice, meat, and milk, clans learned that they could extend the shelf life of perishables while treating themselves to an aesthetic culinary experience. After the evolution of Babylonian beer in 7000 B.C.E., farmers enhanced revenues by making new

beverages from dates and palm sap and by diverting malted grain to brewing 26 different beers. By 3000 B.C.E., the use of 40 percent of Babylonian cereal grains for beer introduced a new social problem, drunkenness and the attendant ills of alcoholism.

The First Wines

Wine grapes (*Vitis vinifera sylvestris*) originated in the Caucasus Mountains around 6000 B.C.E. Along the Tigris and Euphrates rivers, the Babylonians became the first to ferment the juice of wild vine fruits and to fill jars with wine. In 4500 B.C.E., vintages from the Macedonian uplands attained popularity, favorably compared to Chian wine (from the Greek island of Chios) as “soft and fair” and praised into the second century C.E. by Egyptian food writer Athenaeus of Naucratis. Digs in a cave on the Arpa River in Areni, Armenia, located a winery dating to 4100 B.C.E. that produced sacred beverages reserved for ritual. The site consisted of a yard-square clay basin where workers pressed domesticated grapes with their feet. Juice trickled into airless 15-gallon (57-liter) fermentation vats. From there, a dry red wine passed to storage jars bound for trade sites as distant as Anatolia, Palestine, and Syria.

By 3000 B.C.E., wineries flourished in China, Egypt, and Sumer. The *Epic of Gilgamesh* (ca. 2600 B.C.E.) includes the oldest surviving account of wineries, describing an urban Mesopotamian culture that valued fermented drink. In this work, a female vintner named Siduri urges Gilgamesh to treat wine and merrymaking as two of the joys of mortal life. The Chinese evolved their own vintages after 2000 B.C.E., dubbing their product *hou jiu* (monkey wine) from the stacking of wild fruit by monkeys. The pre-Olmec of Mexico and the Nubians of Sudan developed their unique alcoholic beverages in 2000 and 1500 B.C.E. The Egyptians turned fermented beverages into taboo drinks for ordinary citizens by reserving wine for pharaohs, priests, and state officials. Wine jars in the tomb of King Tutankhamen, sealed in 1323 B.C.E., attested to the boy king’s preference for red wine.

The Etruscans, Greeks, Romans, and Phoenicians dominated the commercial cultivation of vineyards and the exportation of beverages for dining and

medicinal use. Around 800 B.C.E., Homer referred to fermentation methods, which concluded with the blending of the vintage with seawater. A century later, the techniques recurred in Hesiod's *Works and Days* (700 B.C.E.) with descriptions of air-drying grapes to temper the flavor, treading out juice, and storing it in terracotta jars. Settlers of Magna Graecia in Sicily and southern Italy in the fifth century B.C.E. named their colonial network "Enotria" (land of wine) for its success at the wine trade.

Essential to the technology governing enzyme action, the specialty jobs of wine pressing and coopering (wooden cask making or repairing) turned home fermentation into an international business. Into the Middle Ages, Catholicism allied with vintners in Corsica, Iberia, Italy, and Provence as a source of wine for the Eucharist.

Fermented Foods for the Road

Over centuries of adapting food preservation techniques, cooks learned to control fermentation to maintain a particular aroma, mouthfeel, or flavor, such as the taste of Chinese rice wine, first fermented around 7000 B.C.E., and the coagulation of *dahi* (sour milk) and the churning of butter in India around 6000 B.C.E. Nomads valued bio-enhanced foods as insurance against starvation or the waste of raw foods during migrations. The Egyptians advanced industrial by-products by turning soured wine into vinegar, one of their most popular commercially processed foods. In 2838 B.C.E., herbalist Shennong (Shen Nung), the "Father of Chinese Medicine and Pharmacology," added the preserved soybean to the curative foods described in his herbal handbook, thus introducing to Asian cuisine one of its most distinctive and versatile staples.

Food preservation enhanced the success of such military expeditions as Alexander the Great's march from Macedonia to the Indus River. For Greek and Roman seamen and soldiers, supply trains carried fermented green olives and sourdough biscuits along with beer and wine. Preserved rations ensured healthful food and beverages devoid of the types of bacteria and amoeba that caused muscle-sapping intestinal complaints. The Roman Emperor Tiberius chose sauerkraut to dispatch on marches to Germania and Parthia, where Roman

legionaries frequently incurred dysentery. Present-day research concurs with Tiberius by confirming the value of lactic acid bacteria in the gut to promote friendly intestinal flora and to quell cholera and typhoid fever.

Bioengineered Foodstuffs

Other fermenting techniques dot the history of prepared dishes. Around 4000 B.C.E., Middle Eastern herders curdled milk in skin bags. By 3200 B.C.E., milk fermentation in Egypt anticipated the pickling of soft Greek feta cheese in 1184 B.C.E. and the popularity of koumiss, which became the staple drink in Asia. By 1500 B.C.E., the Babylonians and Chinese blended ground meat with salt, spice, and sugar and stuffed sausages for drying.

During the Zhou dynasty, publication of the Confucian ritual text *Zhouli* (*Chou-li, Rites of Chou*, compiled ca. 1116 B.C.E.) covered the transformation of meat and millet into *chiang*, a brined mash fermented in sealed jars for 13 weeks. Fermented with yellow aspergillus mold, *chiang* produced a salty flavor similar to soy sauce. During the Han dynasty (202 B.C.E.–220 C.E.), the fermentation of seasonal fish added a natural accompaniment to *chiang* as well as to pickled beets, cabbage, cucumbers, radishes, and turnips, which the Chinese preserved as condiments and as transportable rations for coolie laborers. In the first century C.E., the substitution of soybeans for meat and the addition of barley, rice, or wheat and select herbs individualized the appeal of *chiang* flavors.

History and art recorded the advances in commercial food fermentation, beginning in 800 B.C.E. with sausage making in Homer's *Odyssey* and covering commercial Roman bakeries in the second century B.C.E. By 500 B.C.E., the Chinese turned soybean mold into an antibiotic. In 54 B.C.E., Julius Caesar discovered the sharp savor of cheddar cheese manufactured in Britannia. He contributed another ingredient to antipasti in 48 B.C.E. with the introduction of sausage to the cuisine of Republican Rome. The Emperor Probus reintroduced wine grapes to Alsatia in 277, two centuries after farmers gave up vineyards for wheat fields.

The chronology of fermented foods scrolled out a list of new taste sensations—Roquefort cheese in 1070, Parmesan cheese in 1200, Spanish sherry in 1430, California wines and Dutch Gouda cheese in 1697, Dom Pérignon champagne in

1698, and California sourdough in 1850. Until the Industrial Revolution, brining, drying, and fermentation remained the most essential food preservation methods. By the late 1700s, improved study through microscopy and application of gas laws turned the art of fermenting foods into a science.

See also: Beer; Bread; Cheese; Cider; Korean Diet and Cuisine; Manioc; Pickling; Sausage; Silk Road; Sourdough; Standish, Miles; Tofu; Vinegar; Wine; Yeast.

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Fertile Crescent Diet and Food Trade

The cradle of civilization, the Fertile Crescent, a metaphoric name for Mesopotamia, bridged three continents— Africa, Asia, and Europe. Spreading over 193,000 square miles (500,000 square kilometers), the region flourished 10,000 years ago at a time when hunter-gatherers gave place to the world's first agrarians. Populated between the Anatolian highlanders of the Taurus Mountains to the north and the nomads of the Syrian Desert to the south and watered by the Tigris and Euphrates rivers, the verdant arc extended from the Mediterranean Sea to the Persian Gulf.

The environmentally blessed expanse encompassed the people of the Levant and Mesopotamia—present-day Iraq, Jordan, Kuwait, Lebanon, Palestine, and Syria and parts of Iran and Turkey. A felicitous climate furthered civilizations created by the Sumerians (2900–1730 B.C.E.), Akkadians (2334–2112 B.C.E.), Assyrians (2000–539 B.C.E.), Hittites (2000–1100 B.C.E.), Amorites (1900–1600 B.C.E.),

and Babylonians (1800–1170 B.C.E.). Contributing to Mesopotamian prosperity, a dwindling population of cave-dwelling hunter-gatherers competed against the seminomadic settlers for territory.

The Fertile Crescent solved a major obstacle to human growth and health. The limited nutrition of staple crops left a mark on early peoples, who suffered anemia, blindness, stunting, and skeletal anomalies. In comparison to neolithic hunter-gatherers, a limited diet reduced average height of agrarians from 5' 9" to 5' 3" (1.75 to 1.6 meters) among males and from 5' 5" to 5' 0" (1.65 to 1.52 meters) among women.

Over time, diversification of agricultural crops and pasturage for cattle, goats, sheep, and swine underlay a unique cuisine for such emergent city centers as Abu Hureyra, Aleppo, Babylon, Catal Huyuk, Damascus, Jericho, Megiddo, Nineveh, Susa, and Uruk, the first trading center. Of the world's edible food plants, 32 grew along the crescent, offering a remarkably varied diet in contrast to the four food plants of sub-Saharan Africa and the absence of any agrarian sustenance in Australasia. A range of elevations spread harvests of annual plants from moist valleys into well-drained highlands. Before residents became farmers, they reaped wild grasses and developed a diet based on carbohydrates and leafy greens and herbs, which they supplemented with the meat acquired by hunting and fishing.

World's First Farmers

In the Neolithic era, after the settlement of Abu Hureyra in western Mesopotamia (Syria) in 11,050 B.C.E., a millennium of drought forced inhabitants to cultivate wild seeds, beginning with rye (*Secale cereale*). As a result of clustering around the most moist and productive fields, population density rose from one to 15 persons per square mile (less than one to 6 persons per square kilometer). To feed all inhabitants, protofarmers domesticated the eight self-pollinating, early-maturing founder crops—barley, bitter vetch, chickpeas, einkorn wheat, emmer wheat, flax, lentils, and peas.

- Flax served human needs from 30,000 B.C.E. A source of food dye and linseed oil, flax heads are 40 percent oil.

- Dating to 9800 B.C.E., emmer, a self-sowing hulled wheat, grew wild in Israel and on the West Bank of the Jordan River valley. From 7700 B.C.E., emmer flourished at Damascus, Syria.
- Lentils, a high-protein pod plant from the Levant, were a Stone Age food crop that entered the human diet in 9500 B.C.E.
- In 9000 B.C.E., wild einkorn, a more productive grain than emmer, introduced wheat cultivation in southeastern Turkey. Agrarianism rapidly replaced the more rigorous and risky hunter-gathering lifestyle.
- Syrians first cultivated barley in 8500 B.C.E. at Abu Hureyra as a nutritious cereal grain and a source of bread and beer. Around 1000 B.C.E., the biblical Israelites used the grain in temple sacrifices. Barley spread along the west-east axis of Eurasia south to Egypt, west to Carthage, and east through Iran to the Indus Valley.
- From 7500 B.C.E., cooks in the Jordan River valley and southeastern Turkey relied on the protein-rich chickpea for food and well-being.
- Bitter vetch, a prolific forage crop, required the leaching of bitter residues to make it palatable. From 7000 B.C.E., vetch served the lowest classes of people as a vegetable and curative and fed communities undergoing drought.
- From 6000 B.C.E., pea cultivation not only nourished farm families with its protein but also enriched garden plots with the plant's nitrogen-fixing roots .

To rid staples of toxins and indigestible hulls and to access maximum food value for adults, children, infants, and invalids, cooks learned to grind, soak, parboil, and rinse some grains and to roast and grate root crops. Grindstones introduced mineral particles to flour and weakened teeth by wearing down enamel and abrading root lines.

The Mediterranean diet had its beginnings in developments dating to 5000 B.C.E. The Akkadian myth *Atrahasis* (1700 B.C.E.) described the survival of humanity between the Tigris and Euphrates as dependent upon the ditching of land, a tedious and backbreaking job and the impetus to stooped posture and arthritic joint pain. Canals controlled flooding and watered rows of arugula, beans, coriander, cucumbers, cumin, eggplant, garlic, leeks, lettuce, and onions.

Slaves and press gangs cultivated and harvested food crops that produced the highest yield and offered a lengthy shelf life. Metalwork introduced the ard plow and the reaping knife, two essentials of farming.

Unlike females in hunting societies, women of the Fertile Crescent gained status as food gatherers and preservers. Storage required the digging of cache pits and lining them with grass to preserve root crops. Domed mud sheds and ceramic vessels with fitted lids kept grain safe from weevils, locusts, and rats. Preparation involved abrading grains between rocks and fanning the chaff away from edible kernels. From rock tools evolved the mortar and pestle, essential culinary tools for reducing raw food to a palatable form.

World's First Grocers

Prosperity transformed human diet and behavior concerning private property and delayed consumption of foodstuffs. Men and women gathered at city gates to sell surplus anise seed, jerboas (rodents), jujubes, fish, turtles, and skins of wine and navigated the rivers to carry edible wares to nearby commercial centers. Sumerians achieved a 40 percent surplus of grain for brewing eight varieties of barley beer, eight emmer beers, and three blended ales.

In addition to cultivating lush fields, farmers around 4000 B.C.E. added orchards to their food production by growing fruit and pistachio trees. Although shrubs, trees, and vines required up to three years to produce a harvest, they augmented a grain-based diet with apple, cherry, and pomegranate juice and puree, fresh and dried dates and figs, grapes and raisins, and olives. Fruits supplemented prehistoric peoples' diet with iron, fiber, potassium, and vitamins A, B, and C. From date palms, growers extracted sap to crystallize into jaggery (palm sugar), an iron-rich commodity easily stored. Merchants transported it to buyers in lumps for dissolving into a sweetener to balance salty, sour, and spicy dishes and for use as a tonic and treatment of anemia and coughs.

Among the Assyrians, dining well on a variety of courses denoted prestige and authority. The king's hunting parties stalked wild boar and banqueted on the kill, prepared by his phalanx of cooks and pastry chefs. With the near extinction of wild gazelles, a paleolithic herding culture added domesticated meat to the

commoner's diet. Cuisine of the Fertile Crescent extended the menu with ducks, geese, onagers (donkeys), pigeons, sheep, and swine along with milk, cheese, and yogurt from aurochs (wild cattle) and goats. At Jericho, the world's oldest inhabited city, the forging and honing of flint-bladed axes and knives simplified slaughtering. Around 6500 B.C.E. at Catal Huyuk in Anatolia, meat consumption preceded bull worship and ritual slaughter. Priests distributed the meat as evidence of the divine grace of the bull-god.

Food and Change

In the world's first food production center, permanent settlements along silt-edged watercourses undergirded Southwest Asia's agrarian-pastoral economy. Chiefs superintended planting, harvesting, and food storage from 5500 B.C.E. For governance, Sumerians chose a *lugal* (leader) to manage water distribution and use. Distribution followed dynastic lines through the extended family.

By 2100 B.C.E., pharmacists prescribed dietary treatments compounded from herbs and honey that targeted specific diseases and organ complaints, such as stomach and digestive ills. Shops offered fresh produce, dried beans and onions, ale, and pastries to nonfarming specialists, specifically, bakers, basket makers, carpenters, millers, potters, and weavers. Recipes for meat, pigeon, and turnip broths accompanied more complicated preparations of roasted meat flavored with garlic and leeks and for pigeons simmered in fragrant gravy and baked *en croûte* (in a crust). At cyclical Mesopotamian festivals, such as the feeding of dead spirits at the monthly *kispu*, food hawkers advertised sweets and cool drinks in the streets.

Traders loaded sacks of barley and sesame seeds on donkeys for transport to metal-producing centers in Afghanistan and Anatolia. By 2000 B.C.E., wheeled carts drawn by horses sped foodstuffs to market faster than donkey-or ox-drawn sledges. Standardized measurements and balance-beam scales invented in Pakistan controlled commodity distribution and pricing. Simple arithmetic kept track of livestock. The abacus figured profit and loss; pictograms and cuneiform account tablets recorded income.

In studies of the Fertile Crescent, archaeologists and anthropologists have

obtained detailed dietary information from bones, coprolites, and middens. Bas-relief and sculpture illustrated the brining, drying, oiling, and smoking of foods. From market contacts, farmers of the Fertile Crescent expanded diet and cuisine with new food crops—chestnuts, rhubarb, rice, and taro from Asia and, from Africa, millet, sorghum, and yams. During times of famine, tribes migrated to richer strongholds to barter for subsistence foods or applied the strategies of hunter-gatherers.

From the ability to feed more people with less effort, residents of the Fertile Crescent achieved a higher birthrate and population density within cramped mud brick villages. Surplus foodstuffs fed the priestly caste and provided city accountants with a basis for stockpiling, distribution, and taxation. As early as 2000 B.C.E., Assyrian worshippers honored the god Anu and goddess Ishtar with the nation's food wealth—the best dates, figs, and grapes; milk-raised calves and barley-fed mutton and lamb; dormice, ducks, geese, and turtledoves; and eggs from ducks and ostriches.

With the evolution of writing, the essentials of animal husbandry, plant cycles, and food growing and preservation passed through community learning centers to subsequent generations. The rise of capitalism and the foundation of a sedentary merchant class created concerns for riches accumulated from the sale of commodity crafts and foods, such as the kitchen stock of cloves found in a Syrian dig and dating to 1700 B.C.E. From a neophyte warrior class, in 1000 B.C.E., cities mustered standing armies and fought rival horse-mounted tribes for possession of property and stored goods. A diet rich in high-calorie carbohydrates and proteins kept soldiers vigorous and ready to defend the region's food-based affluence.

See also: Agriculture; Coprolites; Hunter-Gatherers; Irrigation; Middens; Poultry; Taro; Trade Routes; Vinegar.

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Film, Food in

The image of food preparation has permeated movie scenarios with the centrality of satisfying hunger. A key to the humor in the Ma and Pa Kettle films—*Ma and Pa Kettle* (1949), *Ma and Pa Kettle Back on the Farm* (1951), and *Ma and Pa Kettle at Home* (1954)—is the backwoods kitchen and cooking style of Ma, mother of 15. More serious food preparation scenes have permeated some of Hollywood's blockbusters, particularly the last farm-s tyle meal as Okies depart from the dust bowl in *The Grapes of Wrath* (1940) and the Texas barbecue and freshly unwrapped steer's head that celebrate a ranch wedding in *Giant* (1956). Late-twentieth-century cinematic presentation of kitchens and meal service as found in *Mystic Pizza* (1988), *Fried Green Tomatoes* (1991), *The Road to Wellville* (1994), *Soul Food* (1997), and *Tea with Mussolini* (1999) expresses the gamut of humanistic themes and motifs— libido, spirituality, clan customs, and creativity as well as the cook's aspirations and virtues.

A natural vehicle for characterizing unity, cookery dominates Julie Dash's balletic *Daughters of the Dust* (1991), an Edwardian era dreamscape where residents ponder leaving Gullah society on the South Carolina coast and abandoning the family traditions that have strengthened their families since slave days. Similarly lyric, Paul Sylbert's *The Grass Harp* (1995), adapted from Truman Capote's autobiographical novel, depicts the repressed Dolly Talbo, who stirs up kitchen cures while feeding and rearing nephew Colin Fenwick. In both instances, the films ally skill at mixing ingredients with the ability to balance hunger and longing.

Asian Food Films

Asian cinema makes its own tradition-centered version of food films that parallel meals with relationships. *Tampopo* (1986), an episodic Japanese comedy, follows the antics of a restaurateur concocting a ramen dish. By juxtaposing scenes involving slurping spaghetti, ordering from a gourmet menu, rifling garbage, and allying food with sexual pleasure, the film extends food influence to multiple aspects of behavior. In the French Vietnamese *The Scent of Green Papaya* (1993), filmmaker Tran Anh Hung examines social disorder and the symbolic uplift of orderly seeds in the fruit. With classic Cinderella elements, the story epitomizes a girl's sexual awakening with her delight in cookery and the aromas and flavors of fresh fruits.

Eat Drink Man Woman (1994), Ang Lee's domestic comedy, pictures a Taipei chef witnessing his family's disintegration. Similar in setting and tutorial style to *Tortilla Soup* (2001), Lee's film dramatizes the control of three daughters through the widowed chef Chu's manipulation of diet and family guilt. Tangled in a skein of personal and career miseries, the girls fulfill filial duty while eluding Papa's control. During the preparation of 100 recipes, the cook readies his girls for self-sufficiency. In all three Asian films and in *Tortilla Soup*, the celebration of food reveals an essential element of life and love that, like a recipe missing an ingredient, requires deft adjustments for balance.

French Fare

An evocative food extravaganza, *Babette's Feast* (1987), a classic screen adaptation of a story by Danish fabulist Isak Dinesen, won the Oscar for Best Foreign Film in 1988 for celebrating a shared dinner as a love feast. Dubbed in French and Danish, the ritual begins with the charity of a cook, an outsider on a small-hearted Norse island where desiccated salt fish supplies the daily meal. In thanks for hospitality, Babette blesses local people with a gourmet dinner observing their deceased founder's birthday. Like the biblical widow's mites, the purchase of foodstuffs and glassware consumes all of her 10,000 francs, the proceeds of a winning lottery ticket.

Played by Stephane Audran, Babette the cook flees fame as a Paris chef renowned for her original dishes and superb wine selection. In an archaic kitchen

overlooking a bleak Nordic seascape, she chops, stirs, simmers, pensively samples, and adjusts a grand menu featuring crated sea turtle, clusters of grapes, and bottles of champagne and a fine Amontillado for her culinary innovations. The camera follows the heroine's hands as she trusses quail, stirs and samples turtle soup, and pours wine for each course. Beyond satisfying hunger, Babette restores diners to humility and forgiveness, traits they had banished as piety, petty complaints, and regret subsumed their better natures.

Filmmaker Gabriel Axel tinged the mounting joy with a controlling irony—to restore love to the sour Lutheran community, Babette sacrifices all she has for a “last supper,” a sumptuous meal as fine as anything in Paris. For service, she instructs a country lad while remaining at the stove as she orchestrates a communal change of heart. To the quarreling, sniping elderly congregation, she plates her dishes as a gift that reconciles them to each other and as a token of thanks to her loving employers. Babette concludes that she is never poor because she always has her art.

Lasse Hallström's cinema fable *Chocolat* (2000), adapted by Robert Nelson Jones from the Joanne Harris novel of the same name, parallels *Babette's Feast* in depicting the conflict between spiritual aridity and sensual generosity. Protagonist Vianne Rocher, an itinerant chocolatier, sets up shop in a small-minded French village in the 1950s. Her generous samples of sweets and counseling to troubled people enrage the Comte de Reynaud, a self-appointed censor and moral director who condemns extravagance during Lent. In a predictable progression, Vianne squares off against the Comte at an Easter Sunday “Grand Festival du Chocolat,” a communion in the Christian sense of selfless joy.

Within the obvious set-to between conventionality and joie de vivre lies Vianne's compensation for her family's rootlessness. In the rustic kitchen, she rules a confectionery domain where mincing block chocolate and creaming fillers and spreading icing and piping curlicues create window fantasias. Her candies grow so powerful that they redress loneliness, timidity, alienation, and sterility. The landlady quickly perceives the connection between lust and delectable chocolates and compares the refurbished patisserie to a Mexican brothel.

The rescue of people from coercion, similar to the motifs of *The Grass Harp* and *Fried Green Tomatoes*, rewards minor characters with bursts of creative

expression, the preface to self-forgiveness. Vianne, a skilled rescuer, shields a victim, Josephine Muscat, a desperate abused wife of the village. Grasping at self-esteem, Josephine masters the flirty grace of the white-tipped Nipples of Venus, an example of the carnal goodies for sale in Vianne's patisserie. When Muscat stalks his errant wife, Vianne clouts him with a frying pan, the symbolic weapon of the master chef.

Food as Liberation

Just as movie cookery liberates, so it channels kitchen work into an outlet for frustration and untapped energies. *Like Water for Chocolate* (1992) applies magical realism to a mother-daughter standoff. In the microcosm of a rancho kitchen, the unloved, unappreciated Tita retreats to a surrogate mother, the peasant cook Nacha, who reanimates her while teaching daily lessons in slicing onions and kneading dough.

While Tita's mother marries off Rosaura, the favored daughter, to Tita's love, Pedro, the repressed kitchen maiden immerses herself in sensual recipes, an escape valve that saves Tita from implosion. Releasing sorrow and yearning, she infects guests with the emotions stirred into the raw ingredients, causing them to weep, laugh, vomit, and lust for their true loves. The birth of Rosaura's child imbues Tita with breast milk that nourishes the unhappy babe and enrages the inadequate mother, who recognizes that her marriage and motherhood truly belong to Tita.

A fairy tale built on pathos, humor, and magic, Tita's story releases her from the stern, repressed mother to a band of revolutionaries and an Anglo physician who offers Tita marriage and security. Still pulled to her first love, Tita opts for the grand emotional recipe, a brief night of love with her badly injured brother-in-law. Encased in food fable, Laura Esquivel's masterful hyperbole enlarges the circumscribed life of Tita, who possesses the womanly skills that even death cannot suppress.

Twenty-First-Century Releases

Subsequent cinema has retained the themes and vigor of cookery as a reputable effort, as in the Thanksgiving of black, Hispanic, Jewish, and Vietnamese families in *What's Cooking* (2000), the parody of fast-food chains in *Waiting . . .* (2005), the comedic debacle at a Passover seder in *When Do We Eat?* (2006), and teaching young city toughs to cook in *Pressure Cooker* (2008). A cartoon study of the career chef in Disney's *Ratatouille* (2007) illustrated the vicissitudes of training and the element of luck that boosts a food magician into a star. His vehicle, a pot of soup, stresses the importance of the basics to transcendent table experience.

The award-winning culinary comedy *Julie & Julia* (2009) saluted food diva Julia Child's influence on American cookery. A determined beginner, the young New York blogger Julia Powell, in the early 2000s, strives to complete 524 of Child's recipes in a year's time by adopting the outlook of her idol. Both mentor and imitator exude the bonhomie and fearlessness of the kitchen scholar who relieved ennui in post-World War II Europe by mastering French gastronomy. Essential to Child's presentations are her endearing efforts to turn dining into a communion of gourmands over a delicious repast.

Less pleasant, the perusal of feeding the drought-ridden Horn of Africa in *Beyond Borders* (2002) poses the fearful dynamics of food riots during famine in Ethiopia, Somalia, and Sudan. From an opposite perspective, the filming of *Under the Tuscan Sun* (2003) romanticizes the Italian kitchen with images of a lone American divorcée feeding workers at her rustic villa with platters of eggplant and peppers. Table generosity broadens the outlook of a newcomer looking for belonging among hardy peasants.

The insidious nature of anorexia nervosa among competitive ballerinas in *Black Swan* (2010) contrasts the generosity of *Under the Tuscan Sun* with self-punishment and excessive yearnings. Nina, the climber in a New York City ballet company, clutches bottled water, a period token of obsessive dietary concerns. Unlike the slow starvation of Irish immigrants in the Australian drama *Ned Kelly* (2003), Nina has choices. Like professional dancers who restrict daily diet to 1,200 calories, Nina rejects normal meals while ravaging her body with rehearsals and self-denial. The depiction of self-torment from competition and eating disorders reveals a period disability among star-struck, body-conscious youth.

See also: African Food Trade; Famine; Markets and Marketing; Trade Routes.

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Finger Food

Dishes and appetizers intended to be eaten out of the hand, finger foods include attractively shaped, ready-to-eat bites that require no knives, forks, spoons, or chopsticks. The selection of food by hand suits etiquette in England, where Cornish meat pies appeal to shoppers, and in Ethiopia and Mexico, where diners scoop a mouthful of tahini or guacamole with bread or tacos, rolled up for convenience, and eat without need of utensils. The simple presentation of finger food also refers to blinis, cocktail wienies, corn on the cob, curry puffs, date balls, ice cream cones, olives, pizza slices, rice balls, sandwiches, and tapas. Some finger foods—buffalo wings, chips, french fries, nuts, popcorn, chapatis, scones—are more suited to baskets than trays.

Before the popularization of flatware, meals among the Arabs, Aztecs, Incas, and Persians relied on finger foods, such as Arab *meze* and Aztec tacos. In the Agora from as early as 500 B.C.E., Athenians purchased *koulouri* (seeded barley buns), mainly for children. In Constantinople, Rome, and Smyrna, wait staff plated one-bite servings, the forerunner of Italian antipasti and Spanish *tapas*, to accommodate diners reclining at table and leaning on one elbow. In Baghdad, Syrian vendors sold triangular pies fried in sesame oil; Greek street sellers offered roasted chickpeas and souvlaki. In Japan, merchants opened hors d'oeuvres shops and sold baby bees and *yakitori* (beef, chicken, and seafood kebabs) to draw the

after-theater crowd from Kabuki and Noh performances.

In the early Middle Ages, deep-fried stuffed figs piqued taste buds with their combination of flavors and mouthfeel. The poor made do with meaty knucklebones and ribs. After 1099 C.E., crusaders brought back to Europe sugared comfits and gingerbread, a savory addition to medieval meals that diners ate out of hand. Into the 1700s, peddlers in Western Europe sold finger foods at public squares, fairs, and weekly markets.

Gradually, street hawkers at mobile barrows and fixed stands drew buyers to the fragrance of cool drinks and hot snacks. Top sellers in Armenia specialized in cheese and custard pies, honey cakes, and baked carrots. By the 1800s, variety increased to include fried bonito, meatballs, pilaf, sesame desserts, and spanakopita (spinach pie). Strollers carried paper cones of roasted chickpeas, pistachios, and pumpkin and sunflower seeds for nibbling while shopping.

North Americans adopted tidbit foods from immigrants, including the Chinese dim sum and pupu platter, French palate pleasers, and Scandinavian smorgasbord. The Pueblo Indians anticipated the American flair for hors d'oeuvres with offerings of fry bread. In the 1950s, the growth of fast food and patio cookouts increased the eating from hand of buns and rolls with meaty fillings and of fish sticks and kebabs. Magazine and electronic ads pictured a relaxed atmosphere among people who selected choice bites and consumed them at a leisurely pace while carrying on vibrant conversations.

The distribution of finger foods accommodated attendees at brunches, cocktail parties, and receptions with inventive combinations of ingredients. In the 1990s, the slang term *grazing* referred to sampling varied offerings. Caterers dispatched waiters with deli trays and salvers containing bruschetta, crudités, cupcakes, fruit and cheese cubes, julienned vegetables, miniature quiches, open-face canapés, oysters on the half shell, and tortillas, with some tidbits served atop cocktail napkins or paper doilies. Currently, at centralized buffets and snack tables, as appetite stimulants, attendees dip chips, chunks of bread, and crackers into cheese balls, fondue, hummus, pâté, salsa, or tapenade.



With roots in the teahouse snacks that fed travelers along the Silk Road, dim sum—dumplings, buns, rolls, pastries, and other bite-size delicacies—became a Cantonese custom. Traditionally, dim sum is served from early morning to mid-afternoon. (Eric Brissaud/GammaRapho /Getty Images)

See also: Appetizers and Hors d’Oeuvres; Crackers; Grilling; Kebabs; Polynesian Diet and Cuisine; Snack Food; Street Food.

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[Fish and Fishing](#)

From prehistory, consumers have esteemed fish for its fragrance, mouthfeel, and taste and for its minerals and protein. From 100,000 B.C.E., waste from burbot, perch, pike, and trout in middens in Alaska, France, Greenland, Korea, and Peru attest to the centrality of finfish to diet. One example, Hawaii, thrived on some 600 coastal species, including anchovy, barracuda, bonefish, flying fish, grouper, herring, milkfish, mullet, sole, and wrasse. The abundance of choices enlarged a vegetable diet with an inexpensive, wholesome meat that energized islanders.

Heavy catches contributed to the global economy, which traded in dried, salted, and smoked stock, such as the grunion nabbed by hand by California tribes. Around 3000 B.C.E., Babylonians creamed herring into a dried paste for flavoring stew. Across the Sahara Desert, North African nomads benefited from trading camels for surplus fish netted by shore tribes. The wanderers diversified a monotonous diet with dried fish, a finger food unharmed by extremes of aridity and heat.

Hunter-gatherers enlarged forest diets with marine food, such as the reef fish prized by Australian Aborigines. Native American digs among the remains of the Abenaki of Maine, the Ainu and Jomon of Japan, the Ertebolle of Jutland, the Huaca of the Andean highlands, and the Vedda of Sri Lanka revealed remains of the alewife, cod, ling, pike, salmon, tuna, and whitefish. The Inuit valued finfish dishes and sauced char and sculpin with fat from sea lions and whales. Mothers chewed fillets and tongued the pulp into toddlers' mouths.

Among the Tikopia of southwestern Polynesia, marine food so bolstered tribal security that they designed calendars around fish runs. The early Maori based cuisine on grouper, jack, parrotfish, and yellow tang, a common reef fish. Wrapped in pandanus or ti bundles, ahi and swordfish roasted in earth ovens alongside tubers.

Tahitians marinated in lime juice *poisson cru*, raw lagoon parrotfish and ocean bream and snapper. At Tongareva in the Cook Islands, lagoons offered safe, reliable soldier fish and wrasse, which cooks prepared with algae and seaweed. Fresh species varied with the availability of streams, which numbered 15 on Tahiti and 111 in New Guinea, where cooks preferred bream, grunter, mullet, and perch. On Tonga, from around 1000 B.C.E., spear fishermen boiled their catch in pottery jars in herbed water. For ritual voyages by double-hulled canoe or outrigger back to Tahiti, mariners ate fresh supplies and netted or trolled for fresh

snapper and tuna.

Fish in Asia and Europe

To the south of the Fertile Crescent, canals, fens, ponds, and rivers supplied 52 fish species. Netters and spear fishermen supplemented a grain and red-meat diet with carp, jack, and vorax, which enabled Babylonians to thrive in cities rather than on farms. Preservers dried, salted, and smoked each catch for the pantry and for trade with Caucasus and Himalayan mountain dwellers. Keys to freshness, the cleanliness of handlers and processors and the speed by which caravans reached markets ensured quality fish free of pathogens that could sicken consumers.

As customers of Phoenician boat traffic, Egyptians acquired protein from brined and dried imports, which doubled as currency. Locally, they relied on carp, catfish, mullet, and perch from the Nile River delta and the oasis at Faiyum as well as from tuna that coursed the Mediterranean Sea in season. Baskets filled with salt fish accompanied the Egyptian builder Kha to his Theban tomb around 1395 B.C.E. In reference to the convenience and nutrition of coastal fish, Homer's *Odyssey* (ca. 750 B.C.E.) declared marine food a blessing.

From 1200 to 333 B.C.E., the land-poor Phoenicians of Lebanon enjoyed a varied diet from imported bream and mullet and fermented *garum*, a fish-based condiment that supplied naval vessels. The Phoenicians exploited the marine market via coasters for short hauls to ports surrounded by reefs and shoals. Around 1000 B.C.E., shipwrights designed larger cargo carriers that transported sturgeon and trout along oceans and major water routes, primarily the Danube, Nile, and Rhone rivers.



Swedish fishermen clean and crate herring at a North Sea fishing village. From Scandinavia to East Asia and the coastal Americas, commercial fishing is an economic mainstay. Aquaculture, however, accounts for a growing percentage of global fish consumption. (*National Geographic/Getty Images*)

At the height of Greek civilization, fishermen retrieved Mediterranean bass, bluefin, and hake with harpoons, *lamparos* (fish lights), lines, *madragues* (net mazes), seines, and tridents. Around 350 B.C.E., the Greco-Sicilian poet Arcestratus praised the bonito, a mildly fatty relative of tuna, for its ease of grilling and baking in hot ash. His advice preceded fish saucing and stuffing recipes in the Roman cookbooks of Apicius and Athenaeus. Early Christians preferred fish to red meat because of the symbolism of the five loaves and two fish by which Jesus fed 4,000 followers. By popularizing fish entrées, the catch of Jesus's fishermen apostles, Christ cults eroded classical Greek vegetarianism.

Until the first century of the Roman Empire, cooks followed the trend of cooking pond dorade and lupus, the subjects of frescoes, mosaics, and the poetic works of Ovid, Plutarch, and Oppian. The Roman encyclopedist Pliny the Elder surveyed pisciculture in depth. Of fish for the table and tavern service, he identified 1,000 types of marine food and extolled Italy for its seagoing fleets, which relied on Bavarian salt for preserving the catch. He admired fish heads over the rest of piscine meat and, for taste and texture, recommended hake,

mackerel, mullet, rockfish, scarus, sturgeon, and wolffish.

In the Roman kitchen, chefs blended myrtle leaf, the emblem of Venus, goddess of passion, in mortars with coriander, grape must, lovage, and oregano to produce a sauce for moray eel or mullet. For satisfying flavor, Pliny singled out the anchovy that Apicius pickled in garum. Because of the significance of marine food to the Roman kitchen, Pliny complained of the price of imported lake barbel, chub, pike, and tench fermented by Lombards. By 301 C.E., sea fish cost almost twice as much as flatfish, mullet, and scarus, fad foods either raised in *piscinae* (fishponds) or wild caught.

In winter, commercial ice fishermen caught sturgeon from the Black Sea to store in ice houses for trade in Christian Byzantium. Salting extended the shelf life of coastal goods for the provisioning of armies, press gangs, and ships' galleys. Because Catholic prelates enforced by law numerous fast days, which included Wednesdays, Fridays, and Saturdays, nonmeat menus avoided cheese, eggs, and milk in favor of fresh fish, eels, and salted kippers, a small oily herring eaten pickled or smoked.

In the Middle Ages, monoculture in inland ponds and adjacent to the shore proved the commercial value of propagating a single fish species. From the first century C.E., Japanese pisciculture at Hokkaido yielded fresh water carp and salmon and saltwater bream and yellowtail. The focus on a single species enabled pond laborers to monitor health and vigor and to prevent disease and parasites. Itinerant Jewish merchants returned home with Chinese carp, which the Ashkenazim of southern Europe preferred for fish balls, patties, and stuffing with eggs and onions.

Around the Baltic Sea, formation of the Hanseatic League by Henry the Lion of Saxony at Lübeck in 1159 stabilized prices by evening out surpluses of grain and salt herrings. To ensure quality, in 1272, Edward I chartered a London fishmongers guild to protect freshness and to control pricing. Among member powers, the control of fishing in the Thames regulated the salmon catch, which the French were already growing in artificial tank environments to compete with wild stock.

During Lent in the Middle Ages, on meatless days, Benedictines ate eggs, frogs, smelts, and snails. Only lords

Recipe: Pollock Balls

Cut 1 pound of pollock into 1/2-inch cubes. In a food processor, pulse the cubes with two egg whites, 2 tablespoons of minced onion, 1 cup of dry bread crumbs, 1/2 cup of cornstarch, and black pepper and sea salt until thoroughly blended. Add three ice cubes and blend for three minutes. Squeeze the mixture into 1-inch balls. Deep-fry in oil or cook in boiling water for five minutes. Serve with a sprinkling of chopped coriander or parsley.

could buy cod, haddock, or halibut pie and salted herring as alternatives to poultry and red meat. As the focus of banquets, the carver artfully sliced whole stuffed carp and lampreys into “gobbets” (bites), a luxury unavailable to the poor.

The poor of Britain dined on poached monkfish or stargazy pie, a Cornish specialty that placed pilchards under a crust with their heads poking through to allow oils to moisten the vegetables below. Scandinavians relished cod or ling soaked in lye and slaked lime to produce lutefisk, a regional favorite served with bacon and potatoes. Danes and Germans panfried plaice, a common flatfish; Norwegians resorted to the strong-flavored pollock for mashing in a mortar and shaping into fish balls.

Resourceful cooks grilled pike in wine sauce and poached salmon in beer. For Muslims in Egypt and Syria, the grilling of whole anchovies satisfied tourists with handy snacks. Among the Roma, recipes for salmon in the 1300s sauced fish steaks with dandelion root and mushrooms. In China’s first cookbook, Huou, Kublai Khan’s chef, published the first marine recipe for carp salad. To marinate raw slivers, the cook made a dressing from basil, chives, ginger, knotgrass, and radishes, all stimulants to digestion. In 1375, Taillevent, Charles V’s cook, advocated mustard for saucing cod.

Fishing in History

Overfishing in the Baltic Sea preceded a herring collapse in the 1400s. Coastal fleets sought schools in the Atlantic Ocean and North Sea. The superior

organization of the Dutch placed them above German and Scandinavian fishermen for 200 years. Commercial traders profited from the technology of Willem Beukelszoon, a Zeeland fisherman, who altered dry salting methods by “gibbing” (pickling) herring in brine. The processed fish boosted the prominence of Dutch seafarers and colonizers of the New World.

Italian navigator John Cabot discovered Newfoundland on June 24, 1497, and proclaimed it a haven for drying and salting cod. Farther south and west, Basque fishermen launched 1,000 vessels on the St. Lawrence River to commercialize Atlantic species. Along the California coast, Mission Indians explained to Spanish evangelists the value of eulachon (candlefish), a source of dried food and oil used for cooking or as indoor lights. Along Lake Huron, Ottawa netters pulled in 100 whitefish at a time and supplied their families with pike and walleye and surplus fish for trade.

At Plymouth, Massachusetts, soldier Miles Standish welcomed Samoset on April 2, 1621, when the Wampanoag sagamore donated roasted herring to the starving English colony. Under Indian mentoring, the Pilgrims learned to fertilize corn by burying oily menhaden at its roots and to fatten cattle on fish offal. Over the next century, fish and fish cakes fed the enslaved and impoverished, such as finnan haddie, haddock smoked over peat and poached in milk for a Scots breakfast.

Native fishermen disdained the European sport of line fishing and chose instead jacklighting, canoe fishing by night with lanterns that drew fish to the surface. Indians demonstrated the harvesting from schools at deltas and harbors, where they set traps and weirs (brush fences). For herring egg dishes, the Tlingit thrust hemlock boughs into the seabed at spawning season and collected ova for herring egg salad. Along the Delaware River, the Mohawk and Mahican bartered fish and maple sugar with Dutch explorers, who introduced aborigines to tin kettles. Native cooks demonstrated to Europeans how to stone-boil a one-pot fish and seaweed soup in mocucks (woven boxes) or animal stomachs. For heat, preparers placed hot rocks in the fish broth with antler forks or branch tongs.

Fish in Commerce and Cuisine

Fish monopolized the royal European diet. At Hampton Court, the Tudor palace of Henry VIII, after 1529, fresh water bream and carp swam moats and ponds until removed for cleaning and cooking. A wet larder stored kippered herring in barrels of seaweed. After the death of King Edward VI in 1553, his half sister, Mary I, reverted to Catholic fast days to shield fishermen from bankruptcy. Tudor entrées continued to feature fish each Friday and Saturday. Chefs baked, boiled, fried, grilled, and poached cod, dace, ling, loach, and sturgeon. In the 1590s, when grain harvests lagged, rural families stretched stores of Russian or Scandinavian stockfish. Cooks ground cod, haddock, or hake bones; liver; and roe into *mortrews*, a pâté thickened with bread crumbs and eggs for shaping into dumplings or fritters.

Supplying fresh fish to the post-Renaissance table accommodated local foodways. In the 1600s, Czechs elevated carp to the focal Christmas dish; other central Europeans ranked poached catfish as a Yuletide delicacy. Germans, Scandinavians, and Ukrainians turned pickled herring or rollmops (herring fillets wrapped around pickles) into an all-purpose holiday dish for Christmas, Easter, and Midsummer.

Among the *boucaniers* (French pirates) of the Mississippi River delta, a secret life of outlawry in Louisiana swamps required ingenuity. To conceal their fires, the men pit-cooked bass, bream, catfish, crappie, and drum over fruitwood or hickory fires and flavored fillets with fruit and spice. In 1682, Russian Czar Peter the Great imported smoked pike, salmon, and sterlet from France as a meal refinement. In 1700, brisk Atlantic trade between Great Britain, the Caribbean, and the American ports of Charles Town, Boston, Newport, New York, and Philadelphia required guards to protect dried and pickled mackerel and spearfish from thievery.

In Portugal around 1750, monks diverted the Alcoa River through Alcobaca Monastery to supply the kitchen with fresh bass and mullet. Around 1774, Greenland's nomadic Eskimo marketed catches of cod and halibut to Scandinavians. Metalworkers in 1810 applied tin to iron containers to produce inexpensive canned cod and herring for sale to the laboring class. By 1850 along the Great Lakes, population growth supported the marketing of caviar, fish oil, and salmon.

In the late 1800s, table displays included sculpted ice surrounded by albacore

tuna, barracuda, marlin, sailfish, sturgeon, swordfish, and wahoo, particularly for buffets and receptions. Because lake trout decreased at the rate of thousands of tons annually, state hatcheries targeted the species for restocking. In contrast to upscale cuisine, the middle class favored the lamprey and mullet in New England, perch and striped bass in the Hudson River valley, buffalo fish and carp in the Mississippi River basin, and pompano, red snapper, and shad as common chowder ingredients in Florida. Jewish cooks shaped carp into gefilte fish, a blend of fillets with matzoh meal and onion for poaching into savory nuggets. During the protracted Jim Crow era, black sharecroppers and poor whites relied on bottom feeders—carp, catfish, and suckers—for breakfast meat and fish fries. Cooking involved rolling fillets in cornmeal and seasoning with hot pepper and salt for “salt-’n’-pepper” entrées.

The International Council for the Exploration of the Sea, the oldest intergovernmental science organization, was formed in Copenhagen in 1902 to define fair catch for European fishing industries. Simultaneously, to meet American needs, the U.S. Bureau of Fisheries began propagating 1.5 billion food fish. Cod, flounder, pike, salmon, shad, trout, and whitefish yielded the most numerous fingerlings, which were added to depleted waters. In 1908, a price comparison established that fish cost from one-third to one-half less than beef, justification for the popularity of fish with middle-and lower-class consumers.

In the 1930s, canned fish ensured protein for families during the Great Depression. Mounting concern over rickets, a vitamin D deficiency that deformed children’s skeletons, sent mothers to women’s magazines for recipes supplementing the diet with deep-sea fish and Newfoundland cod liver oil, a mineral tonic mixed with orange juice. Before the iodizing of commercial salt, sea fish also prevented goiter. In a study of goitrous and nongoitrous areas of the United States, a chart of iodine-rich fish instructed the home cook on the dietary value of haddock and mackerel.

Another issue, the dwindling supply of marine edibles, beset nations with concerns for the future of the marine trade, notably, flounder from the Gulf of Mexico, which had declined statistically by 90 percent from preindustrial levels. The consequences of overfishing in the early 1900s killed off fresh water Russian species, reducing a source of wild foods for Siberians. In the mid-1900s, the Japanese, the world’s top fishermen, exploited their coastline to satisfy appetites

for fish, both raw and steamed. Because Americans continued to favor beef, chicken, and pork, the public accepted the philosophies of catch and release and no-kill zones, in which sport fishermen returned to the wild bass, cod, flathead, marlin, salmon, tarpon, and trout.

In the seven decades preceding the late 1960s, the global catch increased by 2,700 percent. For China, Russia, and the United States, sophisticated fishing methods— long-range navigation (loran), plane spotters, radar, and sonar— enabled factory ships to pull in huge catches for canning or freezing. Local regulations encouraged the rescue and release of bycatch, the species unintentionally ensnared in nets. The burbot disappeared from British waters. The Scandinavian fishing industry netted so many wild Atlantic salmon that ichthyologists began to worry about extinction. Similar short runs of Pacific salmon off British Columbia, California, Oregon, and Washington presaged a loss of sustainable fishing.

In 1973, the U.S. Endangered Species Act protected the habitats of imperiled fish from biocide, human exploitation, and poaching, especially North American halibut. The law came too late to save the extinct pupfish, but it did protect bluefish, chub, cod, eulachon, menhaden, shad, smelt, sturgeon, sucker, and wild salmon. Kenyan, Tanzanian, and Ugandan fishermen stopped harvesting Nile perch, the most seriously overharvested species in the region. In the late 1970s, to monitor home waters, nations began declaring offshore fishing grounds exclusive economic zones as far out as 200 miles (320 kilometers), including the declining hake runs off Argentina and Chile. Greenpeace red-listed the deepwater marlin, monkfish, ocean perch, shark, skate, sole, and swordfish as food and sport species vulnerable to destructive capture methods and pirate fishing.

Japanese American chefs in California popularized sushi and created a 1970s trend for California rolls, a blend of avocado and whitefish bound with mayonnaise and rolled in rice. Exacerbating the demand for marine food, the vogue of omega-3 fatty acids in the diet in the 1990s caused restaurants to popularize broiled salmon as entrées and salad toppings. Diners anticipated reductions in blood pressure, circulatory problems, hardening of the arteries, heart arrhythmia, rheumatoid arthritis, and triglycerides. Seafood processors ballyhooed oily anchovies, halibut, herring, mackerel, salmon, sardines, and tuna. To limit consumption of dioxin, heavy metals, and polychlorinated biphenyls

(PCBs), the World Health Organization in 2006 established the International Fish Oil Standard, a sophisticated monitoring agency at the University of Guelph, Ontario.

The quality of pond-raised fish required additional federal scrutiny for spurious substitutions. In the early 2000s, the U.S. Department of Agriculture regulated 100 percent organic fish by outlawing genetic engineering of species, growth hormones, and irradiation. In processed cod cakes and fish sticks, the “organic” label indicated at least 95 percent organic fish or at least 70 percent pure fish blended with organic breeding.

Late-twentieth-century health concerns refuted previous advocacy of fish in the diet. The promotion of marine meals in the early 1900s did not anticipate the outcry over fat-soluble pollutants and mercury or the banning from human consumption of endangered ahi, mackerel, orange roughy, shark, swordfish, and tilefish. High mercury adulteration of albacore and bluefin tuna threatened pregnant women. Another deterrent to fish in the diet, parasites such as roundworm infestation of wild salmon and cod worms, flukes, nematodes, sea lice, and tapeworm in ceviche, gravlax, sashimi, and sushi decelerated consumption of uncooked fad foods.

In the twenty-first century, fish remains prominent in national and regional cuisines throughout the world— Alaskan stink fish, Baja-Mex fish tacos and veracruzana ceviche and red snapper, Barbadian breakfasts of grilled flying fish with lime, Filipino kinilaw (cold cured fish marinated in chili sauce, Hawaiian raw poke appetizers (sliced raw fish), Irish fish and dulse, New Zealand fish kebabs, Norman chowder, raw tuna for Japanese sushi, Scots haddock and chips, and Vietnamese fish ball soup and *nuoc mam* (fermented fish sauce), a fragrant dipping sauce. As finger food, consumers prefer cod, haddock, and plaice in English fish and chips, Japanese imitation crab sticks made from hake, Korean *eomuk* (pureed whitefish on a stick), and Russian blini with sturgeon roe and pickled herring.

Keeping pace with a world demand that tripled from the mid-1960s, aquaculture produced an estimated 45 million tonnes (50 million tons) of fish in 2004. Such innovations as the raising of salmon by Canadian, Chilean, New Zealand, Norwegian, Russian, Scots, South African, and Tasmanian fisheries and of grouper in ponds off the coast of India and the Middle East have broadened the

definition of farming to include hydroponics. Additional culturing sites in China, France, Spain, and Turkey produce turbot, a flatfish that yields four white fillets for baking and poaching. Commercial operators have upgraded purity in propagated catfish and tilapia, sources of easily digested protein in comparison with mammalian meats. Food-deficit countries such as Ghana, Namibia, Nigeria, Senegal, and Thailand exploit anchovy, hake, and tuna marketing as a means of requiting national debt and relieving malnutrition.

See also: Aquaponics; Cod; Endangered Species; Lapérouse, Jean François Galaup; Poisonous Foods; Roman Diet and Cuisine, Ancient; Scandinavian Diet and Cuisine; Shellfish Trade Routes; Tudor Diet and Cuisine; Whaling.

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[Food Network](#)

Inaugurated in New York City on April 19, 1993, the Food Network began offering viewers a panoply of expert cookery and advice on heirloom and trendy ingredients, holiday and special occasion menus, food safety, and kitchen equipment. Every day begins at 5:45 A.M. with prepping dishes, purchasing flowers and ingredients, and staging sets to accommodate the guest chef of the day. Researchers outline the background of culinary history from salt to sea

urchins. Web specialists post recipes from the day's lineup. The full effect of the Food Network is a revitalization of American cuisine.

Essential to daily shows, hands-on preparation illustrates for home cooks the intricacies of a vegetable chiffonade and the blending of egg mixtures in hot sauces, two deft touches on chef Sara Moulton's call-in show *Cooking Live* and sequel, *Sara's Secrets*, and trussing poultry, an on-camera skill aired on a classic episode from the Julia Child library. One of the network's most popular chefs, Emeril Lagasse, a cook of Massachusetts-Portuguese background and longtime host of *Emeril Live* and *Essence of Emeril*, injected humor and verve into his demonstrations, jolting recipes with generous amounts of garlic and spices.



Iron Chef America, the U.S. adaptation of a popular Japanese cooking show, is a flagship series on the Food Network. In each episode, a new challenger takes on one of the regular celebrity chefs in a cooking competition that features a theme ingredient. (Jim Cooper/Associated Press)

Other past programming established the unique approaches of network stars. For straightforward culinary training, Wolfgang Puck, the Austrian maven of fusion cuisine, tutored beginners on *Wolfgang Puck's Master Class*. Casual, easygoing Rachael Ray hosted *30 Minute Meals* and *\$40 a Day*, seductive-voiced

Ina Garten accentuated a low-key prep style on the *Barefoot Contessa*, and Mario Batali invigorated *Mario Eats Italy* and *Mario, Full Boil*. Graham Kerr, a puckish Londoner starring in *The Galloping Gourmet*, teased his fans into enjoying kitchen work as fun and relaxation. In 2004, the network exploited the wedding of Paula Deen, the exuberant doyenne of Southern cookery on *Paula's Home Cooking* and *Paula's Best Dishes*.

Viewers caught the fever in challenge events such as *Last Cake Standing*, *Bocuse d'Or*, and *Iron Chef America*, one of the network's longest-running series. For the latter, contestants, facing off in a kitchen stadium, receive a main ingredient to be used in the entire contest menu—Arctic char, asparagus, barracuda, beets, chilies, cranberries, even elk. Major winners have included Southwestern grilling specialist Bobby Flay and Greek and Mediterranean master chef Cat Masaharu Morimoto of Japan.

Additional flair derives from other celebrity foodies and chefs, such as TV meteorologist Al Roker, BBC broadcaster Nigella Lawson, potables adviser Kevin Brauch, low-calorie expert Juan-Carlos Cruz, and Chinese American restaurateur Ming Tsai. One jovial duo, Jennifer Paterson and Clarissa Dickson Wright, injected eccentricity into *Two Fat Ladies*, a four-season hit in the mid-1990s featuring British favorites—bubble and squeak (fried potatoes and vegetables), deviled kidneys, fish pie, and roast goose with prune stuffing. The two cooked with flippant unconcern for the healthy food movement and directed sassy salutes to cigarettes, cocktails, and fat calories from beef drippings, butter, lard, and unpasteurized whole milk.

Varied personalities have ensured idiosyncratic style to suit the demands of tailgate parties, New Year's Eve bashes, backpacking, and sedate banquets. Programmers boosted appeal with catchy series titles—*Aarti Party*; *Have Fork, Will Travel*; *Licence to Grill*; *Lighten Up!*; and *Sugar Rush*. Avoiding the cliché of uptight kitchen regimens presented with surgical precision, Food Network programmers win viewer approval and commercial advertisers with such innovations as *Cupcake Wars*, *The Great Food Truck Race*, and *Diners, Drive-Ins and Dives*.

See also: African Diet and Cuisine, Sub-Saharan; Famine; Maritime Trade Routes; Vegetarianism.

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Free-Range Foods

The liberation of farm animals from cages results in free-range dairy, eggs, meat, and poultry produced under humane standards of animal welfare. A compassionate philosophy of husbandry based on living in nature and feeding by browsing, free-range farming relies on an animal's natural instincts to feed itself rather than to rely on daily allotments of grain and water in a cage or barn. In exchange for unfettered movement in fresh air and sunshine, the animal, whether quadruped or poultry, tramples plants and hurries the return of green matter to the Earth as rain-absorbing humus. In anecdotal reports, food experts across the United States, Europe, China, and Pacific Rim declare that the symbiotic relationship between plant and animal yields stronger limbs and wings and tastier, higher-quality animal products.

All free-range livestock lives on green forage as opposed to corn, cottonseed, and soy meals bolstered with antibiotics and artificial additives, the typical feed on industrialized farms. Browsing herd animals—cattle, goats, horses, llamas, pigs, sheep—thrive on subdivided pasture and paddock rotation, a system similar in biological control to salmon and shrimp aquaculture. Swine such as those pastured in Australia eat better when they have access to fresh-flowing water and lanes to mud wallows to cool their skin. Lamb producers in New Zealand lower energy expenditures by pasturing rather than confining sheep in sheds. Grass-fed beef is less often exposed to herbicides and pesticides and is less likely

to bear *Escherichia coli* (*E. coli*) contaminants than are penned and stalled cattle.

The logic of raising unfenced animals rests on traditional, benign methods of husbandry. By freeing birds to comb pastures for alfalfa, clover, insects and seeds to nest naturally, Austrian and British farmers reduce cannibalism and feather pecking and end the need to debeak chicks. Birds that spend their days outdoors occupy cleaner, drier houses at night. By ranging over the land, they promote an ecosystem that requires less labor, energy, and equipment for maintenance. Eggs from foraging hens contain thicker albumin, deeper orange yolks, lower cholesterol and fat, and more omega-3 fatty acids and vitamins A, B12, and E.

Opposition in the United States to free-range livestock derives from fears for neighboring properties and for potential losses to a \$350 million natural beef industry and a \$7 billion poultry industry that yields 78 billion eggs per year. Industrialized farmers claim that constant manuring of yards and pastures from up to 80 chickens per acre (200 per hectare) results in ammonia odors, dead grass, and muddy, polluted runoff. Another danger to the public, the availability of polychlorinated biphenyls (PCBs) to foraging livestock increases threats to packaged meats and milk. Producers who prefer yarding and feedlots to free range complain that competitors make unsubstantiated claims about nutrients in their eggs, milk, and meat and that they earn inflated prices by playing on the sympathies of animal rights defenders.

See also: Agribusiness; Aquaponics; Local Food Movement; Taboos, Food.

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Freeze-Drying

The physical condensation of ice to a gas, freeze-drying (or lyophilizing) reduces the liquid in food and pharmaceuticals to retard spoilage and yield the highest-grade of dried processed comestibles. At Machu Picchu, in Peru, the Inca preserved potatoes by freezing them on slopes of the Andes Mountains. The low air pressure at high altitude allowed water to vaporize, leaving the tubers in a light, brittle state easily reconstituted with cooking liquids. Around 500 C.E., Japanese monks at a Buddhist temple on Mount Koya perfected a similar process of drying fresh *ko ya-dofu* (soy tofu).

Invented in 1890 and developed in Switzerland by Nestlé in 1938 to preserve coffee, modern lyophilization produced Nescafé as a means of saving surplus beans for the Brazilian Coffee Institute. Processing required vacuuming moisture at -45 degrees Fahrenheit (-43 degrees Celsius) before sealing coffee in cans to prevent rehydration and damage by oxygen. During World War II, Nestlé manufactured Nescafé as a standard military beverage. The reduction of liquid also preserved blood plasma and penicillin at room temperature over an extended period for ease of handling and storage. With concepts created by Hungarian scientist Sándor Mihály in the 1960s, the Nestlé Company continued experimenting on the freeze-drying of foods.

Preservation Breakthroughs

Freezing and drying preserved instant soup, fruit juice powder, guacamole, royal jelly, seaweed, ready-to-eat meals, vacuum-dried fish fillets, and wheatgrass, a health food powder that removes heavy metals from the body. The dehydrated food retained more fiber and vitamin C than oven-or sun-dried produce and remained stable during transport. Food processors applied dehydration to acaí, apples, bananas, coconut, mangos, peaches, raspberries, and strawberries, such as the fruit added to muesli, and to basil, chives, ginger, parsley, and other common cooking herbs and spices. Lettuce and melons, however, proved the poorest candidates, for losing too much of their cell structure from rehydration and yielding a gritty texture.

Because of the reduction in heat damage caused by other methods of drying, early attempts at freeze-drying fresh meat, sausage, and seafood produced a higher-quality product and lower microbial content than did other preservation strategies. Dehydrated food cubes, liquids, and powders supplied John Glenn's Mercury-Atlas earth orbit on February 20, 1962. For subsequent Apollo missions, Whirl pool freeze-dried food into bite-size cubes and Neapolitan ice cream into bricks. Pureed foods and liquids sipped from tubes proved less appealing for their lack of mouthfeel.

For 14 years of shuttle missions to the International Space Station, the National Aeronautics and Space Administration (NASA) packed freeze-dried foods, such as broccoli, cauliflower, shrimp, snacks, and spinach at some 20 percent of their original weight. Pouches contained a valve for the injection of water before placement of each dish in a warmer. Meals reheated in ten minutes. Another plus for bulk control, the packaging served as a disposable eating dish, thus lightening loads for return trips. Limited entrées, however, caused menu fatigue.

Marketing

In the 1960s, food technologists predicted a wider application of freeze-drying to the marketplace. In 1966, two cryogenic engineers, James L. Mercer and Hachiro J. Togashi of San Francisco, pioneered hot water extraction and freeze-drying to Tasters Choice coffee, a Maxwell House product. Mercer's patents included freeze-dried green beans for the U.S. Army, domestic spices, and fresh fruit in See's chocolates. Because of the reduction in weight in the first freeze-dried items, meals for cyclists, expeditioners, mountain climbers, rescuers, and spelunkers were less bulky and more convenient for carrying in backpacks and emergency kits. The food became porous but, upon reconstitution, retained aroma, color, flavor, and texture as well as vitamins and minerals.

In 1968, during the Vietnam War, the 11-ounce (312-gram) Long Range Patrol (LRP, pronounced "lurp") ration for the U.S. Marine Corps included flexible packaging of beef hash, chicken stew, mutton, pork, sausage, shrimp, or squid to ensure consumption of 1,100 calories per day. Each lurp required 3 cups (0.71 liters) of water to reconstitute entrées, rice, and vegetables. By 2001, the military

increased food value to 1,560 calories and offered 12 LRP menus, including scrambled eggs and bacon, spaghetti, teriyaki, and a western omelet. In Bozeman, Montana, AlpineAire experimented with high-energy sports and survival meals, including couscous, potato cheddar soup, gumbo, lentils, and split peas. However, apart from coffee processing and extreme military and outdoor needs, freeze-drying stalled because of increased efficiency in chilling and freezing foods.

Since 1970, Mountain House, a division of Oregon Freeze Dry, has offered a variety of zippered pouches of barbecue, beef stew, chicken and mashed potatoes, chili, lasagna, noodle and rice dishes, scrambled eggs and ham, seafood chowder, surimi, sweet and sour pork, and turkey tetrazzini. Vegetarian stock includes applesauce, avocado, blueberry cheesecake, corn and peas, cottage cheese, granola, macaroni and cheese, milk, mushrooms, onions, pasta primavera, pudding, whole eggs, and wild rice and mushrooms. Except for fruit and ice cream, food sealed in pouches lasts seven years and offers less enticement to prowling bears. For dieters, the prepackaged meals from Nutrisystem require minimal handling and the addition of water for rehydration.

Because durable enameled cans retain contents for up to 25 years, families store cases of freeze-dried meals for use in disasters. Survival kits are available for spans of from three to 90 days, including meals for dogs, ferrets, and fish. Customers demand quality preserved foods, such as Belgian and Dutch lactobacillus, cheese made from kefir cells, chicken nuggets, chocolate, Finnish cultured milk, freeze-dried Bolivian *chuño* (potatoes), green tea powder, Miyako brand miso from California and Japan, and malolactic and mesophilic bacteria for acidifying feta cheese and yogurt. A brisk business encourages companies to improve freeze-drying technology and to reduce the costs of food preparation and packaging.

One advance involves the coating of brittle foods with whey protein film to prevent bruising and crumbling. Another application, the centrifuging and dehydration of beta-carotene for insertion into capsules, reduces the size and weight of a nutraceutical absorbed in the small intestines. In India, Nigeria, and Pakistan, the addition of freeze-dried leaf plants and milk concentrates to children's meals combats anemia and kwashiorkor, an acute stage of malnutrition. *See also:* Beef; Coffee; Inca Diet and Cuisine; Industrial Food Processing.

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French Diet and Cuisine

Evolved by a vigorous, food-oriented culture, French cuisine satisfies the passion of both earthy and urbane tastes. In the 400s, early medieval French fare tended toward brined and dried meats and vegetables and heavy seasonings for pies and hippocras, a dessert wine. The agricultural class relied heavily on grains. The elite raised carp and pike in ponds and kept poultry yards for pheasants and pigeons. Dolphin, peacock, and swan entrées came to the table dyed and gilded for display amid a crush of pitchers and platters.

Into the 800s, Charlemagne, king of the Franks, managed the French market economy by controlling food prices, funding food banks, and standardizing market weights and measures. He elevated respect for beans and chickpeas and dignified table behavior. For the sake of a healthy citizenry, he modeled abstemious consumption of roast meats and wine.

Taillevent, the fourteenth-century Norman-French compiler of France's earliest-known cookbook, de-emphasized late medieval spicing. His revamped recipes allowed chief ingredients to unleash natural flavors, the foundation of classical French cookery. By the late 1400s, guilds controlled commerce in fish and grain and provided catering and pastry at contract rates.

The Elegant Table

At the height of the Italian Renaissance, the arrival of Catherine de' Médici, bride of Henry II, from Florence to Paris turned dining into a sensory experience. She introduced refined touches to game and added to kitchen gardens artichokes, asparagus, broad beans, and peas. For her grand dinners, Italian cooks abandoned heavy medieval recipes in favor of aspic, ice cream, layered pasta, onion soup, seafood, sherbet, truffles, and turkey, a North American import. Tableware featured the fork, an innovation in place settings.

In the 1600s, Pierre La Varenne, chef to Queen Marie de' Médici, systemized the principles of French gastronomy and popularized light pies and desserts. In place of heavy reliance on bread crumbs as thickeners, he exemplified to a generation of cooks the quick-stirring of roux (fried flour) as a basis for gravies and sauces. His rational examination of showy table fare foretold the evolution of modern foodways and the rise in stature of the *saucier*.



The head chef puts finishing touches on pressed duck, the specialty of the house at La Tour d'Argent in Paris. Claiming origins in 1582, Tour d'Argent is the oldest and most famous restaurant in the city. The ducks are farm-raised and numbered. (Christophe Ena/Associated Press)

In 1691, caterer François Massialot, author of *Le Cuisinier Roïal et Bourgeois* (*The Royal and Middle-Class Cook*), publicized the banquet and reception menus

avored under Louis XIV. Among Massialot's innovations, the text listed crème brûlée, marinade, meringue, and ragout, all produced with specialized utensils. After the dissolution of the royal dynasty during the French Revolution, democratization produced a demand for restaurants, a concept uniquely French in its commercialization of catering to suit the nouveau riche.

In the early 1800s, chef Marie-Antoine Carême elevated French cuisine with the architectural *pièce montée* (mounted display), created to please the Emperor Napoleon and his entourage. Carême defined basic saucing under the headings *allemande* (cream and egg sauce), *béchamel* (white sauce), *espagnole* (brown sauce), and *velouté* (meat glaze). His contemporary during the early 1800s, food writer Jean Anthelme Brillat-Savarin, turned eating into an intellectual exercise in savoring exotic ingredients of the nation's postwar revival of grand cuisine.

Georges Auguste Escoffier, the "Father of Modern French Cuisine," polished the innovations of his predecessors by regimenting kitchen staff into specialists. After formulating the first à la carte menu and Russian style service of one course at a time, he introduced individualized plating by waiters, which French chef Félix Urbain Dubois popularized. In place of Carême's decorative extremes, Escoffier focused on taste rather than table decor. In some 5,000 recipes, he created innovations that included crêpes Suzette, pêche Melba, and soufflés. To the four basic sauces outlined by Carême, Escoffier added hollandaise (a thick dressing of butter, egg yolk, and lemon juice) and tomato sauce. His light touch guided heavy gravies toward flavorful dressings and garnishes and the hearty flavors of *coq au vin* (braised chicken with wine).

Modern Flair

From 1900 to the present, the French solidified their centuriesold reputation for fine dining. To direct the post-World War II boom in culinary tourism, Michelin Guides ranked, with a star code, comfortable and luxurious inns, restaurants, and regional entrées at reasonable cost. The handbooks directed amateur gourmets to the best in peasant dishes and high-end dining that paired entrées with suitable wines.

In the *Larousse Gastronomique* (1938), culinary encyclopedist Prosper

Montagné clarified French techniques for smoothing a bisque, glazing a *galantine*, and injecting moisture into a *farci* (stuffing). His text described the provenance of regional specialties—Alps cheese, Alsatian sauerkraut and sausage, Bordeaux wines, calvados and *galettes* from Brittany, currants and mustard from Burgundy, Catalan snails, Gascon pâté, mushrooms from the Loire River valley, and herbs and honey from Provence. He explained how heritage cookery accommodated Algerian pilafs, American barbecue, Corsican chestnuts and citrus fruit, German sauerbraten, and Italian aperitifs to generate a sophisticated Continental fare.

In the 1960s and 1970s, *nouvelle cuisine*, pioneered by Paul Bocuse, replaced elaborate *haute cuisine française* (high French cookery) with short menus featuring uncomplicated free-form dishes devoid of formality. In place of saucing, chefs flavored entrées with meat stock and reductions that suited the demands of health-conscious consumers. From the 1970s into the present, American kitchen maven Julia Child gave credibility to French gastronomy through cookbooks and television demonstrations of such kitchen skills as kneading dough for brioche and trussing a goose.

In recent times, *cuisine du terroir* (regional gastronomy) has replaced the undisciplined experimentation of *nouvelle cuisine* with respect for traditional country fare. Rustic dishes have advanced to prominence for their sensible combinations of herbs with fresh ingredients for such dishes as cassoulet and quiche. In 2010, UNESCO declared France the perpetuator of an “intangible cultural heritage” in fine eating.

See also: Boré, Jean Étienne de; Brillat-Savarin, Jean Anthelme; Carême, Marie-Antoine; Charlemagne; Child, Julia; Creole Diet and Cuisine; Cussy, Louis, Marquis de; Escoffier, Georges Auguste; La Varenne, Pierre; *Larousse Gastronomique*; Médiçi, Catherine de'; Nouvelle Cuisine; Sauces and Saucing; Taillevent.

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[French East India Company](#)

The French East India Company (FEIC, La Compagnie Française des Indes Orientales) pursued vast colonial dreams but succeeded in the food trade only on the French islands of Mauritius and Réunion. Established in January 1664 by Finance Minister Jean-Baptiste Colbert, the French venture began at a disadvantage against the Dutch, English, Portuguese, and Spanish, who had established prominence in the Asian beverage and spice trade. The joint-stock endeavor replaced three forerunners— the *Companie de Chine* (China Company), *Compagnie de Madagascar* (Madagascar Company), and *Companie d’Orient* (Eastern Company)—with a single brokerage operating under a royal charter from King Louis XIV.

The FEIC issued stock worth £625,000 and commissioned a flagship, the armed frigate *Saint-Paul*, to set sail from Brest. Because of the hesitance of entrepreneurs to risk cash against established European commerce, Louis XIV became the major FEIC stockholder. Management fell to three competent traders: Director-General François Caron, a 30-year Dutch East India Company veteran hired by Colbert; Director Marcara Avanchintz, a Persian merchant from Armenia; and Admiral Pierre de la Haye, an ambassador heading a nine-ship fleet. Colbert directed writer François Charpentier to manage an advertising campaign to arouse the French from economic insularity, which enslaved the economy to foreign commerce. Charpentier published a pamphlet, “A Treatise

Touching the East-Indian Trade” (1664), available in French and German, urging capitalists to invest in the import of cinnamon, coffee, cotton, and pepper.

During French colonial expansion, the FEIC built on the explorations of Admiral Paulmier de Gonneville in 1603. Authorized by France’s Henry IV, the firm determined to exploit markets in the Indian and Pacific oceans. After introducing French commerce in West Africa in 1624, the French merchant marine created trading ports at Île de France (Mauritius) and Île Bourbon (Réunion), where settlers began arriving in 1665 to plant highly profitable coffee and sugarcane. The FEIC excelled at commerce in coffee, cotton, food dye, pepper, and sugar. Under Colbert’s restrictions, ware houses stocked only top-quality goods from Guinea, India, the Levant, and Senegal.

One disaster, the wreckage of the *Taureau* on July 11, 1666, off Antongil Bay, Madagascar, cost the company a full load of rice; on November 1, 1681, the *Soleil d’Orient* disappeared with its hold filled with Siamese cotton and spices. Additional losses to attack, cyclone, the pirate La Buse (Olivier Le Vasseur), reefs, a slave mutiny, and yellow fever proved to nervous investors the hazards of the sea trade.

Brokerage centers at Surat and Masulipatam in 1668 and Pondicherry in 1673 based French merchants in India for the first time. Pondicherry grew into a major European stronghold. Attempts at building an additional outpost at Ceylon (Sri Lanka) and St. Thomas on the Coromandel coast in 1672 to market French beans, millet, and rice failed to dislodge the Dutch.

Because of financial instability in 1719, the FEIC reorganized four years later under the name *Companie Perpétuelle des Indes*. Officials opened a new outpost at Mahé in Malabar and operated 14 merchantmen out of India’s southwestern shore. The annual sale of goods in 1735 reached 2,667 tons (2,419 metric tons) of coffee, opium, and tea, which swept England, France, and Holland as a mealtime fad.

By 1740, French colonies turned an annual profit of 250,000 livres on cacao, coffee, cotton, ginger, and rum. Quickly, however, the FEIC lost business clout to British merchants. In 1741, Robert Clive, governor-general of the British East India Company, expelled the French from Indian trade and governance. After the FEIC sent Governor-General Joseph François Dupleix to colonize southern India for the Bourbon throne, he seized Madras and established a capital at

Pondicherry in southeastern India. In 1751, local chiefs sided alternately with the French and British in a company conflict known as the Second Carnatic War. The superiority of the English navy and land forces decided the commercial fate of India. After the British captured Pondicherry, the FEIC dissolved in 1769.

During this period, the FEIC continued to cultivate Mauritius and Réunion as well as the Seychelles in 1750, when islanders exported surpluses of corn, rice, and wheat. The islands served as naval refueling stations and victualers (provisioners). Naval nutritional deficiencies decreased after ship surgeons insisted on stocking lemon juice as an antiscorbutic. Island agronomists planted test nurseries with 3,000 specimens of pepper vines, mountain rice, along with breadfruit, camphor, cinnamon, clove, cocoa, coconut, lychee, mango, and nutmeg stock that bio-pirate and environmentalist Pierre Poivre smuggled from Mocha and Timor.

In his travelogue, titled *Travels of a Philosopher: or, Observations on the Manners and Arts of Various Nations in Africa and Asia* (1770), Poivre described the rich flavor of Mauritian coffee, which workers gathered in dry weather when the beans reached perfection rather than harvest in the wet season like West Indian growers. An intellectual of the age of enlightenment, Poivre valued creativity. He credited Admiral Bertrand-François Mahé de la Bourdonnais, governor of Réunion, with furthering agricultural projects with cinnamon, cocoa, coffee, cotton, indigo, mulberry, pear trees, sugar, tea, and “Turkey corn” (*Dicentra formosa*), a tuber from the corydalis plant. La Bourdonnais also introduced manioc, which became a principal foodstuff for field slaves.

Poivre made significant strides in advancing the world’s consumption of imported foods. He promoted the Malayan sago as a source of soft nourishment for an invalid diet and also recommended Vietnamese dates and saffron and Siamese fruits, particularly the banana, durian, gac fruit, mango, mangosteen, orange, and pineapple. Poivre regretted that, despite the natural food wealth of Siam, the people lived in misery under a despotic government that exported the highest grade of local food for profit. By his persistence in planting denuded ground in the French islands, Poivre succeeded in smashing the Dutch monopoly on clove and nutmeg.

See also: British East India Company; Dutch East India Company; French West

India Company; Peppers.

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[French West India Company](#)

In its short life (1664–1674), the French West India Company (FWIC, *Compagnie des Indes Occidentales*) capitalized on trade at 12 Caribbean islands. The region flourished from French pioneering, receiving some 150 freighters per year, most of them Dutch. In the absence of currency, shopkeepers accepted tobacco. To the dismay of Finance Minister Jean-Baptiste Colbert, only four of the merchantmen represented French brokers. In the name of King Louis XIV, Colbert founded the French West India Company and formulated a policy of *l'exclusif* to redirect profits to France.

Colbert intended to monopolize the island trade in coffee, cotton, ginger, hides, indigo, roucou cheese dye (*Bixa orellana*, or annatto), sugar, syrup, and tobacco and to turn the French colonies into a source of revenue. Investors planned to stem paganism by spreading Christianity while supplanting the Dutch, English, and Spanish at profiteering on Caribbean plantations. Colbert also maintained a personal interest in Martinique and St. Lucia, where he owned plantations.

From data gleaned from a survey of the West Indies by Admiral Bertrand d'Ogeron in 1656 and an inspection of Martinique the following year, the king on May 28, 1664, granted the FWIC the remains of the French African Company at Senegal and extended to Amerindians full French citizenship if they converted to Christianity. Encompassing territory from Cape Blanco, Senegal, to the Cape of

Good Hope in South Africa for a period of four decades, the commission superintended land between the Amazon and Orinoco rivers in South America, all of Canada and Acadia, Newfoundland, and the French West Indies. The latter consisted of Grenada, the Grenadines, Guadeloupe, Hispaniola (Saint-Dominique or Haiti), Marie Galante, Martinique, St. Barthélemy (St. Bart's), St. Christopher (St. Kitts), St. Croix, St. Lucia, Tobago, and Tortuga. (Because investments were international, possession of individual islands shifted erratically among Europeans.) The FWIC also absorbed the Cayenne Company, Company of New France, and Company of the Cape Verdes and Senegal. Only fishing rights remained free of government control.

Exports vs. Daily Food

Carib attacks, hurricanes, malaria, and tillage of the islands proved so devastating that few of the earliest settlers survived. To encourage immigration, the French abolished arbitrary duties and taxes and standardized currency,

[Recipe: Grenadan Oil Down](#)

Soak 1 pound of salt pork or ham and 1 pound of salt cod overnight in cold water. Bring to a boil and drain. Core and slice 3 pounds of cassava into 1/2-inch pieces. Stir-fry one chopped sweet onion and one chopped garlic clove in 1 tablespoon of vegetable oil. Slice one bunch of green onions and chop with 1/2 cup of chives, one celery rib, and two sprigs of thyme, and stir into the drained fish and meat. Add this and the cassava to the fried onion and garlic. Season with one whole habañero pepper and 3 to 4 cups of coconut milk. Simmer for one hour until the cassava absorbs the milk. Serve with glasses of citrus juice.

measures, and weights. The prohibition of trade with the Dutch on September 30, 1664, deprived islanders of necessities. The situation worsened as the French directed the planting of cash crops, labor-intensive work that prevented laborers

from fishing and cultivating vegetable gardens. Instead of beef, chicken, and wheat, islanders subsisted on sea cow (manatee) and salt cod, lizards, pigs, yams, other vegetables, and cassava root, the main source of bread for workers and slaves. A standard dinner consisted of bacon, pea soup, and cassava bread or “oil down” (stew) flavored with hot pepper.

Deficiencies in FWIC finances prevented French expeditions from leaving Nantes. Parts of a convoy arrived at the Cape Verde Islands and Martinique in February 1665, when agents distributed clothing, salt beef, and wine from Anjou and Nantes. Subsequent surpluses of cod, vegetables, and wheat arrived from Canada. Settlers complained that the French failed to satisfy food needs in a timely manner and demanded the return of Dutch traders. The strongest opposition from peasants arose at Guadeloupe, Hispaniola, Martinique, and Tortuga, where sentiment favored commerce with the Dutch and Flemish. Nonetheless, aristocrats at Martinique celebrated the formation of the FWIC with feasting and toasts to the king.

Food Business

In a year’s time, after the FWIC began building merchantmen, agents dispatched 60 ships from the ports of Bordeaux, La Rochelle, Nantes, and Rouen. Sales advanced from offices at Bordeaux, Dieppe, Havre, Honfleur, and St. Malo as well as from Texel, Holland. Refineries sprang up in France to turn raw sugar into cooking-grade sugar and syrup, sweeteners that replaced honey in French recipes.

In February 1665, the company appointed D’Ogeron governor of Tortuga and of French colonies in Hispaniola, the major source of profits from sugar. Company officials planned to trade French bacon, biscuit, brandy, flour, Irish butter, livestock, olive oil, peas, and wine for Caribbean food and indigo, which FWIC brokers marketed in Baltic, Flemish, and French ports.

In summer and fall 1665, English corsairs captured five FWIC vessels and confiscated ginger, sugar, and tobacco. War with England in 1666 forced French captains to remain in port. Investors chafed at the expensive hiatus, which slowed the expulsion of Spanish colonists and inhibited agricultural expansion into cocoa, cotton, indigo, and tobacco. When islanders at St. Christopher threatened

revolt, company agents formed a militia to put down the rebels.

In 1669, after a company reorganization, FWIC prospects improved at headquarters in Fort Royal, Martinique. Unaccustomed to the intense heat, white workers gradually bought themselves out of indenture and invested their money in African slaves. French commerce blossomed but not to the degree that Colbert had hoped. As the sugar trade burgeoned, investors wondered at the failure of commerce to produce profits. The reason—free trade—derived from the independent spirit of the islanders, who refused to maintain loyalty to the FWIC. They welcomed Dutch merchantmen to Petit Goave, Hispaniola, and drove out D’Ogeron, who retreated to Tortuga. Merchants also supplied dried beef, salt cod, staples, and wine to the cash-rich pirates at Tortuga.

In 1670, D’Ogeron returned to power under orders to capture or scuttle all Dutch merchantmen. At Port de Paix, Hispaniola, he rewarded islanders with a boatload of 50 female orphans, whom he auctioned for wives, but the irregular importation of food continued to dampen planters’ enthusiasm for colonialism. Nantes profited from expeditions and dispatched 24 vessels in 1672. Within two years, the islands produced 6,000 tons (5,400 metric tons) of sugar, making France the prime merchant of granulated sweeteners to European kitchens.

In December 1674, Colbert abandoned his grandiose plan, abolished the company, and ceded control of trade to the crown and private companies. Nevertheless, by 1683, France was marketing 10,350 tons (9,400 metric tons) of sugar per year.

See also: French East India Company; Manioc.

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Frézier, Amédée François (1682–1773)

Scots-French explorer, engineer, and spy Amédée François Frézier made culinary history by introducing Europeans to the Pacific Coast strawberry, an indigenous plant that flourishes from Alaska to Patagonia. Frézier's family crest, dating to 916 C.E., displayed three *fraises* (strawberries), a portent of his contribution to world fruit production and consumption.

Born at Chambéry, Savoy, to a law professor, Frézier chose not to follow his father's profession. After training in science and theology in Paris, he conducted postgraduate work in architecture and art in Italy. At age 18, he entered the French infantry as a lieutenant and compiled a treatise on fireworks. His knowledge of ordnance earned him a position in military engineering and intelligence at Saint-Malo.

Posted to Chile and Peru by King Louis XIV on January 7, 1712, to advance defensive fortification on the Pacific, Frézier charted watercourses of southwestern South America. From his observations, he plotted fort and harbor construction along the coast. Posing as a merchant skipper, he infiltrated Spanish installations at Concepción, Chile, and recorded troop strength, escape routes, and ordnance storage. He noted the apparent ease with which native provisioners grew artemisia, bay, balm, chamomile, endive, mint, sage, tansy, and turnips and how they specialized in dye plants as well as herbs for aromatherapy. He marveled at how the introduction of apples and pears after the Spanish conquest had so quickly produced fruit orchards. At Santiago, he appreciated the bounty of peaches at Carnival Time. He remarked on the daylily, the root of which Indians dried in an oven and ground into meal for making pastries.

Frézier's immersion in local biota pinpointed the beach, or coastal, strawberry (*Fragaria chiloensis*), a larger, firmer heart-shaped fruit than the tiny wild Alpine strawberries in Europe (*Fragaria vesca*). The Chilean variety produced an appealing fragrance and clusters of rosettes along stout 18-inch (46-centimeter) stolons that were three times the length of Alpine berry runners. Frézier was not the first European to investigate the indigenous coastal strawberry. Initially viewed by Spanish conquistador Francisco Pizarro at Cuzco, Peru, in 1550, the whitish-red berry, called the *frutilla* (little fruit), became a staple in the Chilean Huilliche and Mapuche diet.

Amerindian farmer's markets sold two dozen berries wrapped in a cabbage leaf for small change—half of one Spanish real. Shoppers tended to eat the fruit raw or dried or to cook it into a sauce for jam or a fruit roll-up. They compressed strawberry leaves into healing poultices to treat canker sores and styes or steeped leaves into a tea to combat diarrhea, gastric bleeding, or infant colic.

Frézier grew specimen plants and nurtured their ground-hugging creepers on the six-month return voyage from Concepción around Cape Horn to Marseilles. To satisfy the plants' need for constant moisture, he sacrificed his allotment of drinking water. Of the five surviving plants when he arrived in August 1714, he kept one for himself and sent another to naturalist Antoine de Jussieu to grow in the Jardin du Roi, the royal herbarium. For Frézier's scientific endeavors, statistics, and map corrections, the king awarded him 1,000 écus.

A sketch of Frézier's strawberry and his commentary in *Relation of the Voyage to the South Sea, Along the Coast of Chile and Perou, Made During the Years 1712, 1713, and 1714* reached print in 1714 and in English translation in 1717. During a posting to Hispaniola in 1719, he suffered from malaria. After constructing forts in Brittany and Germany and compiling a text on three-dimensional geometry, he retired at age 82 and devoted himself to hobby engineering, history, and travel.

Through Frézier's influence, a profitable berry business at Brest ranged from the Chilean varieties to similar salt-resistant hybrids. The fruit earned its place among other foods that prevent scurvy. In 1720, Dutch botanist Herman Boerhaave studied Frézier's discovery, which he passed to English horticulturist Philip Miller at Chelsea in 1727. Miller accidentally crossbred the Chilean berry with the North American *Fragaria virginiana*, which grew from Canada to Virginia. Propagation resulted in 1766 in the modern garden strawberry, *Fragaria ananassa*, which grew to plum size. Swedish naturalist Carolus Linnaeus boosted the popularity of the Chilean strawberry, which the French interplanted with the *Fragaria moschata* and *Fragaria virginiana* varieties at Cherbourg to yield fruit 7.5 inches (19 centimeters) in diameter. Thomas Jefferson, at his experimental gardens in Monticello, Virginia, scoured the market for the large-fruited Chilean plant stock but was unsuccessful. By 1882, berry farmers at Plougastel, France, marketed 1,500 tons (1,350 metric tons) of Frézier's Chilean berries.

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Fructarianism

An extreme pacifist subcategory of veganism, fructarianism limits the diet to fruit, nuts, and seeds—all foods that fall readily from the plant. The diet reflects the life source of early hominoids, who were frugivores (those who eat fruit only). It gained popularity in the 1910s as a progressive solution to land use and human drudgery. A more inclusive form allowed chocolate, corn, cucumbers, eggplant, grain, honey, legumes, olive oil, pepper, pumpkins, sesame and sunflower seeds, sprouts, and tomatoes. Another version, liquidarianism or hydroritarianism, excludes pulp and seeds and relies solely on alternating fasting with fruit juices.

The philosophy of a fruit diet derives from the first chapter of Genesis, which describes the plants grown in the Garden of Eden. Under Jainism, the purpose of grain and meat taboos is to avoid killing animals or plants. Strict fructarians believe that their role in nature is to subsist on the flesh that surrounds the seed and to spread the seed to new locations.

Advocates maintain that the rapid putrefaction of meat indicates a danger of gut poisons that slow-decaying fruits avoid. Another argument for fructarianism, the appeal to the senses engages eye, nose, hand, and mouth in appreciating the natural grace and appetite stimulation of berries and fruit. Because fruits are ready for immediate consumption, they involve no recipes or preparation to intervene between collection and enjoyment. Diners eat fruit skins as a benefit to the body. They consume edibles at room temperature, introducing no extremes of

hot or cold to the alimentary system.

Nutritionists scrutinize the fruit diet for deficiencies in calcium, fat, iron, protein, vitamins B12 and D, and zinc. Its limitations may threaten the growth and maturation of children, whom social agencies may seize from parents who withhold more conventional foods. Critics of a strict fruit diet for children warn of anemia, malnutrition, and protein and vitamin deficiency. A lesser argument against an extreme diet, social isolation sets fruit consumers apart from those who eat a wider range of raw and cooked foods, including bread, meat, milk and dairy products, and sweets.

Fructarians respond that fruits, especially bananas, coconut, dried dates, and marmalades, are naturally sweet and that almonds and peanuts, nut butters, and nut milk provide sufficient carbohydrates, fats, minerals, and proteins to sustain health and longevity. Avocados and bananas gain respect for adding fat, protein, potassium, and amino acids to the diet.

Proponents of fructarianism list the advantages of individual varieties, claiming the value of strawberries to the joints and the anti-inflammatory qualities of blackberries, blueberries, and pineapples. They assert that fruits and nuts cause less colitis, diarrhea, hyperacidity, and indigestion than meats. Fructarians also state that apples and grapes, applesauce, apple tea, cider, grape juice and wine, and raisins satisfy while ridding the intestines and mucous membranes of microbes.

Fruit eaters contrast factories that process foods to the beauty, balance, and fragrance of fruit gardening. Frugivore eating habits reforest the earth with self-replicating bushes, trees, and vines and cleanse the air and land of pollutants.

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Fungi

Living in symbiosis with bacteria, flora, and fauna, some 70,000 types of fungi augment diet and cuisine as vegetables and as components of beer, bread, and cheese. Growing like plants, fungi reproduce from spores and feed on organic matter. Unlike true plants, the fungal fruit-body lacks chlorophyll, flowers and leaves, roots and stems, and seeds.

Examples—*Aspergillus*, baker’s yeast, and Quorn— permeate gastronomy with specific flavors, textures, and improvements to recipes. *Aspergillus* forms the essence of sake and soy sauce; baker’s yeast (*Saccharomyces cerevisiae*) releases gases that raise dough for dumplings and loaves. As a “functional food,” fungi benefit the body as bioactive promoters of wellness and reducers of disease. For a vegetarian regimen, Quorn, a trademark form of *Fusarium venenatum*, offers a healthful substitute for meat.



The truffle is the most luxurious of edible fungi, sometimes referred to as the “diamond of the culinary world.” The black truffles of France’s Périgord region, among the most prized, grow in the shade of hazelnut and oak trees. (Jean-Pierre Muller/AFP/Getty Images)

Edible mushrooms, such as button and portobello varieties, are a natural food dating to the hunter-gatherers from 200,000 to 10,000 B.C.E. Taoist priests treasured medicinal fungi, nutraceuticals such as the bamboo and *Trametes* mushrooms, for treating cancer, hepatitis, infection, immune system failure, and reproductive and respiratory ills. In the kitchen, mushrooms add complex aroma, flavor, and texture to cuisine. Gourmands favor costlier blue, Roquefort, and Stilton cheeses, enoki and porcini mushrooms, and truffles for their uniqueness.

Despite the ubiquity of fungi in cookery, a small percentage of mushrooms can cause hallucinations and severe intestinal and cardiac reactions leading to illness or even death. For some varieties, toxicity accumulates over time. Historically, ergotism from a rye fungus precipitated medieval and Renaissance era sorcery trials and persecutions of folk healers.

The appeal of chanterelle, cremini, king oyster, and morel mushrooms derives from their plump shapes and fresh, earthy scent. They require little handling or trimming and survive in the pantry in oil or vinegar as well as dried or frozen. They pair well in green salads and appetizers with capers, herbs, and olives. The caps and vertical slices hold hearty stuffings for a brief broiling or toasting. Sliced mushrooms in frittatas, gravy, pasta, pilaf, quiche, and soup complement the flavors of lemon and mustard as well as parsley and dill. Another common use, sauteed mushrooms enhance the aroma of vegetarian sandwiches.

See also: Beer; Bread; Cheese; Poisonous Foods; Wild Food.

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Fusion Cuisine

An innovative convergence of ingredients and cooking styles, fusion cuisine merges regional and national gastronomy to produce novel dishes that preserve individual traditions. The concept of eclectic cuisine flourishes in areas experiencing high immigration, particularly eastern Australia, Canada, Hawaii, and the Middle East. The best of fusion techniques dispels otherness with an auspicious union of strange and familiar ingredients, such as British Columbian game birds prepared low-fat style and complemented with wasabi.

In multicultural settings, adventurous gourmands try new flavors, much as Alexander the Great nibbled his way from Macedonia to the Indus River. Chefs prepare unfamiliar ingredients by established cooking styles and top the new with sauces and garnishes as identifiable as Nigerian peanut sauce and French meunière (brown butter sauce). Likewise, tourism brings disparate peoples together with unfamiliar cuisine, introducing Cantonese to British high tea, Scandinavians to Thai spring rolls, and restaurateurs worldwide to the American demand for Coca-Cola, hamburgers, and french fries.

Hybrids in History

Historically, the hybridizing of food traditions tends to follow political, religious, and military transitions. In the first century B.C.E., the posting of Roman legionaries throughout Africa, Asia Minor, and Europe tempted Italian men to try British barley beer, Iberian paella, and Arab desserts made from dates and figs. After 1096, the Crusades yielded a new height in cultural mixing by sending European adventurers to the Holy Lands for lengthy duty. In the hot Mediterranean environment, Muslim chefs cooled menus with melon dishes and pomegranate sorbets. From returning soldiers, European restaurants developed a culturally diverse offering of chilled fruit drinks and herbed eggplant. One introduction, spiced gingerbread iced British style and served with lemon curd,

found its way into Christmas desserts, Easter fairs, and tea tables.

A Renaissance explosion of fusion menus followed the arrival of Christopher Columbus in the New World in September 1492. Global food choices doubled with the addition of barley bread, beef, cabbage, cheese, figs, lettuce, olives, pork, salted herring, and wine to Cuban and Haitian dishes and avocados, chili peppers, chocolate, corn, pecans, potatoes, tomatoes, and turkey to the traditional recipes of Italy and Ireland. Italians sauced their pasta with tomato gravy; the Irish added potatoes to nearly every meal. After the Spanish invasion of Mexico in 1519, Aztec cuisine accommodated dairy items and grains introduced by the Spanish and Portuguese. From the collision of forces grew a serendipity, post-Columbian Mesoamerican cuisine.

Voyages became the conduits of global foodway unions. The arrival of Asian Indians to the West Indies influenced curry experiments in the beef and seafood restaurants of Guyana, Jamaica, Tobago, and Trinidad. Likewise, immigration from the Black Sea and Baltic Sea after 1920 expanded markets and recipes in Russia. In a border accommodation, in 1945, Hispanic chefs altered Mexican cookery to suit the tastes of the American Southwest. Texas restaurants referred to their menu selections as “Tex-Mex,” the first named fusion cuisine. Along the eastern Mediterranean on May 14, 1948, the establishment of the state of Israel brought together Jews from multiple food traditions, including Moorish almond cakes and nougats from Iberia and chicken soup and cream and egg combinations from Eastern Europe.

Commercialized Fusions

The proliferation of fusion restaurants in the United States followed Chinese American chef Richard Chow Wing’s Chinese-French improvisations in the 1960s in Hanford, California. His eclectic background as a U.S. Army cook for General George C. Marshall introduced Wing to varied entrées from China, Germany, Italy, Russia, and Switzerland. His restaurant, the Imperial Dynasty, fed Chinois flavors to famous actors, entrepreneurs, and politicians, including escargot with ginger root and Napa wines to Chiang Kai-shek and Madame Chiang.

California pioneered commercial food diversity with a wealth of fresh

ingredients from field, ocean, and orchard. In 1971, chef Alice Louise Waters, educated in Corfu, London, Paris, and Turkey, orchestrated local organic ingredients at her award-winning Berkeley restaurant, Chez Panisse. Her lighthearted combinations wed wax beans to figs and prosciutto, lamb to black-eyed peas, and nectarines to bourbon-pecan ice cream.

In 1973, a parallel experiment in Lima, Peru, caused Nobuyuki Matsuhisa to formulate a traditional Japanese menu by trial and error with Peruvian market produce. From South American ingredients, he concocted a Japanese roll sauced with Peruvian ceviche, sashimi tacos with kelp salad, squid pasta, pumpkin chips with mustard miso, and a signature entrée, yellowtail with jalapeño pepper. His dishes pleased clientele at his restaurants in Argentina, Australia, the Bahamas, China, Dubai, Hong Kong, Hungary, Italy, Russia, and South Africa.

In the 1990s, *fusion cuisine* replaced *nouvelle cuisine* as the period food buzzword, with Florida rapidly gaining on California for the culinary melding of “Floribbean” food. In defiance of the terroir concept of cooking cheese, grain, vegetables, and wine grown in the same microclimate, audacious cooks expanded on trans-American and Eurasian menus. Austrian chef Wolfgang Puck, who apprenticed in Monaco and Paris, brought his styles to Spago in Los Angeles and Cut in Singapore. His menu at Spago featured his flair for mergers—Virginia striped bass with bok choy and shiitake mushrooms, New York steak with bordelaise sauce, American club sandwich with Italian aioli (garlic mayonnaise), and goulash with German *spätzel* (egg noodles). In the early 2000s, fusion cooks acquired a reputation for overreaching, a tendency to dismay diners with such bizarre juxtapositions as Mexican chutney and tandoori chicken with Turkish puff pastry, brought together as trendy curiosities.

See also: Columbus, Christopher; Huou; Israeli Diet and Cuisine; Mexican Diet and Cuisine; Sicilian Diet and Cuisine; Silk Road.

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G

[Gama, Vasco da \(ca. 1460-1524\)](#)

A long-distance Portuguese navigator and colonizer of East Africa and India, Vasco da Gama, the first European to reach India by sea, used food as a diplomatic tactic.

A native of the fishing village of Sines, Portugal, da Gama excelled at astronomy and mathematics. In 1492, King John II dispatched him to sea to protect Portuguese merchantmen from French seizure.

Duplicating the explorations of Bartolomeu Dias around the Cape of Good Hope to western India the previous decade, Admiral da Gama set out from Lisbon on July 8, 1497, under King Manuel I, to redirect the Arab-Venetian spice monopoly from the Silk Road to a sea route around Africa. Aboard the flagship *São Gabriel*, he led three other ships, including a supply vessel carrying flour, honey, lentils, onions, plums, salt beef and pork, sugar, and wine. His mission was the expansion of the Portuguese *cartaz* (trade monopoly) to African and Asian ports of call.

According to an anonymous chronicler in *Roteiro da Primeira Viagem de Vasco da Gama* (*Journal of the First Voyage of Vasco da Gama*), the route took da Gama's flotilla to Cape Verde for fresh fruit, vegetables, and water. Down Africa's western shore, he observed natives plying torches to smoke out bees before robbing the hive of honey.

In January 1498, da Gama noted in his crew swollen extremities, rank breath, and ulcerated gums extending over teeth—the symptoms of scurvy, a disease unknown to Iberians and caused by a deficiency of vitamin C. Beached at St. Helena Bay in South Africa in November, he remarked on natives who ate only herbs, gazelles, seals, and whales but made no connection between recovery from scurvy and the provisioning of his men with a variety of fruit. In exchange for trinkets, a tribesman at the Cape of Good Hope supplied the sailors with an ox for roasting, a treat to men overfed on salted meat. Da Gama arrived on the eastern

side of South Africa, during Christmas 1497, and named the place Natal, the Portuguese term for Christ's birth. At Mozambique in March 1498, the Portuguese offered their limited trade goods and had to settle for pigeons, vegetables, and fruit, which also relieved scurvy.

Pirate and Legate

On the route north to Kenya, da Gama fired cannon on Mozambique in retort to Muslims who refused to fill his water tanks. The admiral stoked his anger against Muslims. As he sailed for Mombasa and Malindi, Kenya, he attacked and raided three Arab merchant ships for gold and silver.

He accepted from Indian Hindu sailors gifts of cloves, ginger, nutmeg, and pepper but puzzled over their rejection of beef. In token of gifts of fruit and sheep, da Gama invited the king of Malindi aboard the *São Gabriel* and served him conserves, marmalade, sweets, bottles of preserved almonds, and cured olives, the most pleasing of the dishes. The Indians rejected gold carafes of wine, with which they were not familiar. The repast concluded with ritual hand and mouth washing from heavy gilt basins and ewers. Because the vessels had served a king, da Gama indicated that no commoner could ever use them. The king accepted them as gifts. Upon the Portuguese departure on April 24, the king sent 12 compact water tanks sewed tight with coir (coconut husk fiber) and caulked with pitch.

Arriving at Calicut (Kozhikode, in southwest India) on May 20, 1498, Admiral da Gama found West Indian markets stocked with inexpensive citrus fruit, dates, melons, dairy products, rice, and palm wine. His chronicler remarked on nan, thin cakes of unleavened bread baked in ash.

The admiral revealed his Portuguese nationality, which aroused enmity in the competitive Arabs. He received from the king fruits resembling figs and melons and a container of betel nut, which his people chewed like gum for a soothing effect. Da Gama insulted the king by presenting paltry gifts—casks of honey, oil, and sugar— and by failing to pay harbor tolls and duties with gold, the usual exchange medium.

Food helped to break the cultural impasse. A gift of Portuguese wheat stirred

the attention of the king, who asked for a ship's cook to explain the use of flour in making biscuits. In exchange, the king dispatched cauldrons of rice, roasted mutton and stuffed poultry, butter, coconuts, figs, nan, and sugar to the fleet. Da Gama won the king's trust by eating Indian food without exhibiting fear of poisoning and reciprocated with a gift of pear preserves and a silver-gilt fork. Because the king insisted that traders deal honestly with the Portuguese, the crew bartered for a small barrel full of spices worth more than 60 times the value of the Portuguese offerings.

Toward Empire

On the homeward route, da Gama lost 116 of his crew of 170 to scurvy and tuberculosis. In March 1499, he paused at Mossel Bay, South Africa, to salt enough anchovies, penguins, and seals to supply the crew with meat. He reached Lisbon in July 1499, having negotiated a commercial agreement to trade with India in cinnamon, cloves, gold, and pearls. King Manuel rewarded da Gama with a coin struck in his honor.

The navigator's piracy and ruthlessness on the second voyage established his reputation as a freebooter. He and his crew of 800 bombarded Calicut in 1502 and mutilated Hindu fishermen. At Madayi, he captured a shipload of 400 Muslim pilgrims, locked them in the hold, and observed men, women, and children through a porthole as he burned them to death. The cruel gesture displayed to Arabs that the Portuguese intended to control the sea route to Asian riches.

Da Gama's first two ventures set Portugal on the way toward empire through the Portuguese East India Company, which monopolized commerce in India's food products. He returned to Lisbon on November 10, 1503, with his ten merchantmen and five warships laden with Asian goods. At Cananor, he left a factor and warehouse to deal in coconuts, dried fish, honey, oil, rice, and sugar and dismayed the Muslim traders by ending their monopoly in pepper and drugs.

On a third voyage, in 1524, da Gama traveled under a new title, viceroy of India, and set a grand table for welcoming dignitaries. Before he died of malaria at Goa on December 24, 1524, he established a Portuguese cinnamon monopoly with Ceylon. From his introduction of Portugal to East Africa and India came

ingredients of Portuguese cuisine—coriander, curry, ginger, pepper, yams, and sweet oranges, the basis of Iberian marmalade.

See also: Coconut; House of India; Maritime Trade Routes; Portuguese East India Company.

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Genetically Modified Food

By reordering the essential material that establishes the uniqueness of a plant or animal, technologists genetically modify ova and seeds. The Green Revolution, a post– World War II scientific initiative that boosted the world’s agrarian yield, introduced manipulation of the very fount of nourishment.

From its inception, genetic modification (GM), a humanitarian bioproject, raised controversy among those who feared bioengineering and its effects on the world’s food supply, human health, and the environment. Nonetheless, innovators, cognizant of the potential benefits, refused to be stymied by such objections. By 1973, the first GM bacteria proved the feasibility of engineering animal life. Subsequent improvements increased the size of wheat grains and lengthened the shelf life of melons and tomatoes. The first successes opened the way to enabling plants and animals to resist fungus, nematodes, and virus and to withstand drought, frost, and saline soil.

For centuries, hybridizing through traditional breeding processes upgraded the bulk and productivity of crops and animals. New in world history, the use of

recombinant DNA by Bayer, DuPont, Monsanto, and Syngenta engineered rapid, controlled change. Poised for breakthroughs in biological restructuring, the world's food analysts proposed distributing hepatitis B vaccines in bananas and goat's milk and producing mature carp and salmon at 30 times the normal rate of growth. Coffee researchers scrambled to isolate the caffeine gene to produce a naturally decaffeinated transgenic coffee bean. Also on the prospectus for alteration were the nutrition and shelf stability of the most perishable produce—alfalfa, apples, bananas, canola, corn, cottonseed, papaya, soy, squash, strawberries, and tomatoes.

Opposition to Change

On the negative side, institutional and commercial cooks feared lawsuits from patrons who suffered ill effects from “Frankenfoods” on blood, kidneys, and liver and on the unborn. Their concerns rallied an all-star list of complainants against big business, big science, and designer foods: Bioengineering Action Network (BAN), Center for Food Safety, Council for Responsible Genetics, The Ecologist, Ending Destructive Genetic Engineering, Environmental Defense Fund, Food First!, Friends of the Earth, GE Food Alert, GE-FREE-LA, genetiX snowball, Gene-Watch, Greenpeace USA, Grocery Manufacturers of America, Hexterminators, Mothers for Natural Law, Public Interest Research Groups, Rural Advancement Foundation International, A Seed, Seize the Day!, Sierra Club, Totnes Genetics Group, and Union of Concerned Scientists. Concern for the future of agriculture and nutrition spawned defiance on both sides of the issue and fueled the Campaign to Label Genetically Engineered Food and to remove altered food from school lunch programs.



At a Monsanto Company research field in Brazil, two genetically engineered soybean plants, one designed to tolerate a company herbicide and the other to provide in-seed protection from insects, grow in adjacent rows. (*Bloomberg/Getty Images*)

In the United States on September 22, 2000, Kraft Foods, a subsidiary of Philip Morris, recalled \$10 million worth of tortillas, snack chips, and taco shells from the shelves of Albertson's, Food Lion, Kroger, IGA, Safeway, and Walmart stores. The summons resulted after a consumer group, Genetically Engineered Food Alert, warned that Mexican bakers used corn adulterated with Cry9C, a protein that kills corn borers. According to the U.S. Food and Drug Administration (FDA), the grain, marketed under the name StarLink by Aventis CropScience of Raleigh, North Carolina, violated federal law, which prohibited any food contaminant that had not received FDA approval.

Ecofeminist Vandana Shiva of the Research Foundation for Science, Technology, and Natural Resource Policy in the Himalayan foothills of India put a humanistic spin on the worth of genetic modification. She maintained that peasant women were more trustworthy than scientists looking to claim a higher yield. In her book *Stolen Harvest: The Hijacking of the Global Food Supply* (2000), Shiva pointed out that miracle seeds and chemical fertilizers introduced into the subcontinent in the 1960s injured the economy, destroying traditional farms and

making crop growers dependent on expensive chemicals. She also questioned the motives of multinational firms that patented India's neem tree and basmati rice. She blamed chemical companies for monopolizing food by "[appropriating] the indigenous agricultural products that are in the hands of the women of those nations and claim them as their exclusive inventions."

In the Philippines, Neth Daño, executive director of the Southeast Asia Regional Institute for Community Education, substantiated Shiva's claims with her own backlash against GM foods. In harmony with the Network Opposed to Genetically Modified Organisms (NO GMOs), she began urging the public in 1998 to stop the sale of bioengineered foods in the island chain, where Monsanto began trials of altered corn two years later.

A compatriot in Rio Grande do Sul, Brazil, Maria José Guazzelli of Centro Ecológico, warned farmers and government authorities that programs involving genetic alteration of foodstuffs had been in operation for two decades. In her opinion, the result might be biological pollutants that could destroy existing food diversity. The immediate benefit of her campaign promoted purer foods from Brazil to compete in the world market against suspect GM goods from the United States. By mid-2001, however, Brazil teetered toward allowing genetically altered seed, which its black market distributed.

Pro-GM forces looked beyond local qualms to an attainable upgrade in human survivability in oppressed locales, a reason for the United Nations' support of the biotech industry. Altruists and moralists in support of GM declared that abandoning biotechnology at this stage of the world's development would condemn overpopulated regions to certain death from famine and malnutrition. Addressing the impact that genetically altered seed can have on lifeways, Kenyan agronomist Florence Wambugu explained the need for herbicide-resistant crops currently overrun with witchweed (*Striga asiatica*), a parasitic plant that strangles corn roots:

We could liberate so many people if our crops were resistant to herbicides that we could then spray on the surrounding weeds. Weeding enslaves Africans; it keeps children from school.

Rather than allow more millions in India and China to atrophy from malnutrition, the fearful demanded immediate fortified riziculture among the world's have-nots. As of 2000, 25 percent of American cornfields produced altered grain; in supermarkets, 70 percent of processed foods contained transgenic

corn and soybeans. In January 2000, 130 concerned nations inked the Cartagena Protocol on Biosafety, forcing exporters to request permission to ship altered seeds and to label them accordingly.

Families may have the last word on what foods they buy and serve to their children. As of 2001, shoppers could buy GM beets, canola, corn, peanuts, peppers, potatoes, soybeans, sunflowers, and tomatoes. To halt their sale and use, protests, food alerts, Internet blitzes, and marches of homemakers and parents of infants and toddlers in strollers induced such food processors as Frito-Lay, Gerber, Kellogg, McDonald's, and Nestlé to abandon modified ingredients and maneuvered the European Union into imposing a moratorium on GM seeds.

Prospects

Despite public and media outcry, critics of futuristic foods failed to squelch the enthusiasm of biotechnologists. The announcement in 2001 of the world's first tomato that can grow in salty water offered a potential solution to a pressing agrarian problem. According to Eduardo Blumwald of the University of California at Davis, the plant could flourish in China, the Indian subcontinent, and the western United States to produce fruit that suffers no alteration in taste. The breakthrough could lead to more hybrid food plants that grow in salt-damaged cropland. In the future, by shifting the delivery of nutrients from emergency workers to home shoppers, food engineers hoped to significantly reduce world hunger among 3 billion rice-dependent people.

In 2003, AquaBounty Farms of Waltham, Massachusetts, predicted the sale of the first chinook salmon raised on growth hormones that enabled it to grow to 8 pounds (3.6 kilograms) in 18 months. To end anemia in some 2 billion people, biochemist Peter Beyer enhanced Golden Rice with the beta-carotene from daffodils and the *Erwinia uredovora* bacterium, which bolstered the diet with iron; this enhancement also prevented child blindness from related vitamin A deficiency. Meanwhile, British and Japanese scientists pondered similar enrichment of beans, cassava, corn, tomatoes, and wheat, all staples with the potential to curtail malnutrition. In 2006, the engineering of swine with omega-3 fatty acids and with phosphorus-absorbing genes increased nutritional value,

while lowering the phosphorus content of pig wastes. Envious growers in have-not nations complained that foodstuffs of the industrialized world dominated research to the detriment of indigenous cowpeas, millet, and teff.

By 2011, grocers were stocking GM apples, bananas, beets, kiwi, lettuce, strawberries, sugarcane, and zucchini as well as flounder, tilapia, and trout, both fresh and in processed foods. The Chinese announced a herd of transgenic dairy cows that produced milk as nutritious as human breast milk. Canadian and U.S. produce carried no warning, but GM foods in Australia, the European Union, Japan, and Malaysia bore labels indicating genetic alteration. At the same time, an increasing number of packaged foods featured non-GM ingredients.

Proponents continue to battle for modification to relieve malnutrition and to augment profitability for world farms. Opponents claim that the outcrossing of unnatural seeds by wind, bees, and birds is already compromising crops grown from pure seed. In August 2011, anti-GM vandals destroyed GM wheat warehoused for distribution to victims of famine in Somalia. The face-off between forces for and against transgenic food brought into focus the reality of hunger and the race to produce enough food for all.

See also: Biopiracy; Ecofeminism; Hormones in Food; Industrial Food Processing; Seed Trade.

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Gourmet Cuisine

The cultural epitome of fine food and beverage, gourmet cuisine satisfies refined consumers with the best in dining while enhancing social status. Gourmet cuisine, which got its start in the 1700s with the rise of commercial eateries, received its first clarification by food critic Grimod de la Reynière, who published a guide to Paris restaurants in 1803 and throughout the Napoleonic era. The term applies to sophisticated fad foods, such as raspberry blini and *gâteau chocolat au rhum*, esteemed for their rarity and price, as well as to food admired by discriminating arbiters of taste at raw juice shops and sushi bars. As a show of savoir faire, gourmets attend wine and cheese tastings in search of a delicious find or order Grand Marnier soufflé, roast guinea fowl, or anything flambé served with freshly ground pepper.

In 1941, Earle R. MacAusland's *Gourmet: The Magazine of Good Living*, forerunner of *Bon Appétit*, *Food & Wine*, and *Saveur*, published up-to-the-minute commentary on restaurants for educated readers, offering taste thrills and recipes by Elizabeth David and Jane Grigson. After the rationing and shortages of World War II, color photos pictured the good life as a porterhouse or T-bone steak. Gourmands upped the appeal by demanding Chateaubriand, carved at the table by an expert and plated with high drama. European favorites permeated menus with bouillabaisse, brioche, *coquilles St. Jacques*, and *pollo alla cacciatora*. Cooking schools and articles by M.F.K. Fisher taught neophyte gourmets how to debone a quail and hand-dip chocolates.

In the 1950s, gourmet food co-ops formed among foodies who welcomed imported exotica or wild fare and experimented with innovative ways of cooking favorites, such as chocolate fondue and plank-grilled salmon with wild rice. Over the next decades, affluent families generated enough cash to fund dining out and shopping at specialty stores for items recommended by food mavens James Beard and Julia Child or advertised under such toney brand names as Godiva, Häagen-Dazs, King Arthur Flour, and Yoplait. In the 1970s, gourmet cuisine abandoned cultic French crepes and beurre blanc for Chinese egg rolls, pad thai, and Japanese dishes stir-fried in a wok from enoki mushrooms, snow peas, and tofu. Details added panache, as with veal in pink peppercorn sauce. The shift from chafing dishes, Bundt pans, and electric skillets required re-equipping kitchens

with Chinese cleavers and bamboo tongs and skewers from Williams-Sonoma.

The emergence of California cuisine and Tex-Mex introduced to 1980s yuppies a new vocabulary, including Cuisinart food processors, Jelly Belly jelly beans, mano and metate, *pico de gallo*, skirt steak, and whole bean coffee ground and prepared in a Krups machine. Pantry items followed the trends, with Hunt-Wesson's Blue Plate Foods, Orville Redenbacher's popcorn, and Paul Newman's dressings and marinara. The cognoscenti stocked goat cheese and kefir, frisée and hearts of palm, mesclun lettuce, and mesquite for savory grilling.

Televised demonstrations spoke casually of crème fraîche, panko crumbs, roasted peppers, squash blossoms, and sun-dried tomatoes in garlic oil as though they were everyday purchases. Chef Craig Claiborne redefined the term *gourmet* with his recipes, which featured haute cuisine without the guilt; Graham Kerr deglamorized the concept with his television show *The Galloping Gourmet*.

A shift away from red meat and to farmer's markets sent gourmet locavores in search of the modish heirloom potatoes served at Chez Panisse in Berkeley, California, and the wood-fired pizzas popularized by the Austrianborn California chef and restaurateur Wolfgang Puck. The desire to stay current quickly discarded pretentious recipes involving espresso powder, honey mustard, pineapple chutney, and pomegranate juice but popularized bok choy, cage-laid eggs, champagne grapes, couscous, orzo pasta, and Vietnamese coriander. At the same time that *gourmet* began to disappear from restaurant names, teens made their own splash in the early twenty-first century by gravitating toward veganism. Internet shopping simplified the updating of the domestic kitchen with the latest implements and ingredients necessary to gourmet cuisine.

See also: Beard, James; Child, Julia; David, Elizabeth; Exotic Food Clubs; Nouvelle Cuisine; Travel Food.

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Greek Diet and Cuisine, Ancient

From 6000 B.C.E., the ancient Greeks allied notions of food and nourishment with concepts of godhood and piety. Because the goddess Demeter bestowed bread and Dionysus provided grapes for wine, Greeks honored food through ritual, hymns, and sacred dance.

The Mediterranean triad—grain, grapes, and olives— got its start in 3000 B.C.E. with the importation of wine making from Asia. Unlike other oenophiles of the Mediterranean world, the Greeks preferred sweet drinks made from overripe grapes or raisins. To shield the vintage from oxidation, vintners produced retsina, a resinated drink that mainland Greeks took on their travels to the Crimea, Cyprus, Dalmatia, France, Italy, Lesbos, Rhodes, and Sicily.

Around 2000 B.C.E., the orchardists of Crete first cultivated the olive tree. Its culture passed to the mainland in 1700 B.C.E. Within four centuries, the olive and its oil became dietary staples. Growers spread hides under the trees and beat the limbs with sticks to dislodge the fruit. After air-drying the olives, preservers salted and pressed them into clay jars for curing. The presentation of olive oil marked special occasions, notably as a prize for the winning charioteer.

Because of the sanctity of the olive grove and its basis of the mainland economy, farmers gave insufficient acreage to barley and wheat. Athenians had to import some 70 percent of their grain from as far away as Syria and the Black Sea and from Greek colonies in Ionia, Magna Graecia, Massalia, North Africa, Spain, Syracuse, and Thrace. Historians surmise that the interruption of the Peloponnesian grain trade caused the rift with Troy in 1200 B.C.E. that poets romanticized as the Trojan War.

As dramatized in Homer's *Iliad* (ca. 800 B.C.E.), wearied soldiers partook of a Pramnian wine posset blended with barley and honey and topped with grated goat cheese. The hero Achilles took the time to prepare baskets of bread, roasted

mutton, and wine for the elderly Trojan King Priam, who humbled himself to beg for the corpse of Prince Hector. In the *Odyssey* (ca. 750 B.C.E.), Homer omitted fish from the classical diet and pictured grain as the source of human marrow. The farmer-poet Hesiod considered grain a holy gift from Demeter to Greek heroes. In *Works and Days* (700 B.C.E.), he linked emmer wheat with *bíos* (life) and testified to the centrality of *maza* (barley) porridge or biscuit, which dominated 70 percent of dietary intake. To spread welcome at table, hosts distributed biscuits and flatbread in wicker baskets.



An amphora dating to the late sixth century B.C.E. depicts Dionysus, the Greek god of wine, the grape harvest, and revelry. Wine, olive oil, and barley provided ancient Greece with dietary staples and economic mainstays. (*Dea/G. Dagli Orti/De Agostini/Getty Images*)

In the wake of Alexander's forays into Asia that preceded the Hellenistic era, the unleavened baked goods of the classical era changed to loaves and rolls. By importing Egyptian knowledge of leavening in the fourth century B.C.E., Greek bakers learned to make risen loaves.

Flavoring the Menu

An adjunct to wheat, honey provided a natural sweetener, dietary aid, funerary gift, and medicine for dressing wounds, a purpose it shared with butter. Beekeepers fed their hives with the flowers of sage, an herb treasured for its curative powers. With top-quality honey from Mount Hymettus, east of Athens,

cooks made meat sauces, wine sweeteners, and cakes and pastries. For salads of beet greens, cabbage, and lettuce, cooks blended a traditional dressing, *oximeli*, an emulsion of honey with vinegar. In worship of Demeter, all Athenians, regardless of station, processed to Eleusis each August to offer honeyed loaves at the Celebration of the Bread, an agrarian ritual.

Bakers contributed flavor to specialty breads and entrées with caraway, coriander, fennel, garlic, *garós* (fish sauce), mint, and rosemary. From Sumer, the Greeks imported thyme, an aphrodisiac; from Crete they imported saffron, a royal herb. Herbs also combined well with lemon juice and sea salt to add subtlety to lamb and vegetable stews. Farther north in Boeotia and Thessaly, more fertile land provided a more varied diet than that of Athens and Sparta. The addition of Cypriot capers to the Greek diet provided savory tight buds for pickling with onions to serve as appetizers or chopped toppings to add zing to rural dinners of beans and peas and cups of goat's milk.

The Greek Table

From prehistory, daily meals fit significant movements of the sun: a light meal at *áriston* (first light), a hot meal at *deipnon* (midday), and a large dinner at *vesperna* (sundown). Kitchenware consisted of iron spits and simple clay hearth cauldrons, domes for baking bread rings, and jars for carrying water from the community well. Cooks ground herbs and forcemeat with salt in mortars and sizzled calamari and small fish on clay *plaki* (griddles). From plain beginnings, the Greeks developed cookery to an art. They invented chef's techniques such as dusting bowls and loaf pans with poppy and sesame seeds and stuffing dough and songbirds with pureed meat and herbed vegetables.

A full menu began with hors d'oeuvres as ordinary as olives and stuffed grape leaves and as unusual as cicadas and grasshoppers, sea urchins, and hyacinth bulbs. The main course of roasted meat included organ meats boiled into a pudding. The anticipated dessert course

[Recipe: Marinated Hyacinth Bulbs](#)

Soak 1 pound of hyacinth bulbs in water for one hour. Trim the top of each bulb, dry the outer covering, and core the bottom. Parboil in water and drain. Simmer in 1 cup of fresh water and 1 tablespoon each of sea salt and red wine vinegar for 45 minutes and drain thoroughly. Pack bulbs in glass containers and cover with vinegar. Serve the bulbs over lentil soup or with other appetizers seasoned with olive oil and snipped chives.

ranged from cookies and sweet rolls to fruit fritters and custard. In “Banquet” (ca. 450 B.C.E.), the poet Philoxenos described a specialty, cheesecake, made with curdled milk and honey. After-dinner wine service accompanied dishes of fruit and nuts and small honey cakes.

After Alexander the Great’s penetration of the Middle East, Persia, and India in 323 B.C.E., most Greeks ridiculed as Persian degeneracy the Theban importation of fads in unprecedented food preparation. Cooks from the Sicilian colonies earned gibes for their dainty spread of multiple delicacies. To provision the pantry, growers in Hellenistic Greece added to pear and plum orchards new tree fruits—apricots, carob, citron, jujube, and pistachios. Market dealers traded Greek oils and wines for asafetida, cardamom, cassia, cinnamon, cloves, fenugreek, ginger, myrrh, nutmeg, and pepper as well as rice from the East. Hearty Macedonian gorging encouraged wild game in Greek menus and open-faced sandwiches made from flatbread topped with meat slices.

Foodways

Greek food service affected all life events, including births and funerals. On departure to the military, *epheboi* (young recruits) packed their own grain rations, which they supplemented on the march with dried fish or meat and salted relishes. Spartans underfed young boys to encourage guile in stealing food. Men’s clubs and academic gatherings held monthly dinner meetings. Theatergoers took intermissions from all-day performances by buying snacks and drinks from vendors.

Women lived more constrained lives. Matrons dined at home. Adult women ate together, apart from men and children. Before reclining on dining couches,

devout females began the meal with drops of wine in tribute to the gods. For weddings, Greek ritual began with the wedding party banqueting with the bride's family. The mother of the bride extolled Hestia, goddess of the hearth and regeneration, as the heart and shield of the home. The bride presented the groom her own flatbread, evidence of her kitchen skill. She carried a wreath of marjoram, a symbol of contentment, and encircled the groom's household fire to avert evil and sanctify her role as wife and mother. Guests tossed dried figs and nuts as a blessing from nature on monogamy.

The Greeks judged the moral probity of citizens by their avoidance of waste and their generous dinner invitations to strangers. Aristophanes' stage comedies ridiculed poor urbanites and soldiers as eaters of onions, *palafi* (fig cakes), and plain flatbread, while elevating the wealthy for a diet including fish, a food for the elite.

Each god accepted a particular sacrificial meat, always from a herd animal. The chef supervised distinctive occasions in the sanctuaries at Delphi and the Poseideia feasts at Delos. On the holy island of Delos, the Magnesians held the franchise for supplying the necessities of hospitality during annual sacrifices. The banquet servers at the Temple of Apollo tested new recipes and rare delicacies and adopted innovations for teaching to apprentices. Strict regulations controlled the age and condition of the selected beast and its slaughter, cooking, and distribution of the meat. The smoke from altar fires bore the smell of roasted flesh to the gods. Vegetarians risked their position in society by refusing to take part.

Food Philosophy

For the sake of health and wellness, Greek physicians associated proper diet with exercise, bathing, and hygiene as keys to survival and the cure for anemia and sickness. In the sixth century B.C.E., the Pythagorean cult invented dietetics, a science that Herodicus of Selymbria, the father of sports medicine, advanced for the athlete's training table before the Olympic Games. As interest in diet expanded, treatises commented on the daily needs of ordinary people. Hippocrates' *De Medicina Vetere* (*On Ancient Medicine*, ca. 390 B.C.E.)

recommended pure drinking water and a balance of food textures—solids, emulsions, and liquids.

Around 450 B.C.E., culinary work advanced to a profession. The slave cook managed a range of recipes for the home kitchen. Largehouse holds augmented daily cookery with the work of specialists, who concocted beverages, jam, and pastry. Cooks and caterers from around the known world vied for elite positions. Their names attached to signature dishes: Agis of Rhodes with grilled fish, Aphthonetos with sausage, Eusthenes with lentils, Lamprias of Sparta with brown sauce made from a roux, and Nereus of Chios with steamed eel. Chariades of Athens refurbished the traditional Greek *thríon*, fig leaf stuffed with bacon, cheese, eggs, and milk, by serving it with an egg white omelette. Moschion opened Athens's first lunchroom. Ariston topped others in the elegance of his dinner planning.

Undergirding the concept of the bountiful table, the myths of Dionysus pictured him wandering the Earth in disguise to test human generosity. To welcome pilgrims at sacred sites, publicans operated *xenodocheia* (inns) and served group meals at banquet halls. For political reasons, Cimon of Athens maintained open house for Greeks and foreign visitors and stocked bath and clothing items and tableware to incorporate the visitor into household fellowship. Both host and guest kept the peace and exchanged handshakes, vows of nonviolence, and ritual gifts as prefaces to friendship, the Greeks' most treasured form of human relationships. As warnings to the unwary, drama, myths, and stories illustrated the dangers of preying on guests or hosts, notably, Menelaus's proper welcome to Paris, the Trojan prince, who abducted Menelaus's wife, Helen of Troy. Homer's *Odyssey* turned boorish behavior into motivation for mass slaughter after the wandering ruler returned and found his wife beset by wooers who lounged about his court and demanded hospitality. In fealty to the laws of Zeus, the private host extended hospitality in emulation of public banquets honoring visiting dignitaries.

The Greek Way

As trends shifted toward ostentation, conservatives defended the plain fare of

their ancestors. Plato scorned Sicilian habits of heavy saucing and accused colonial Greeks of gluttony and sexual excess. Greco-Syracusan poet Arcestratus's *Hedypatheia* (*Life of Luxury*, ca. 350 B.C.E.) advocated a guest list limited to five people and the service of the freshest fish and vegetables in bitesized pieces for casual picking up in one hand or scooping up with bread. Drawing on food experiences in 50 ports, he valued geese, pig's womb, and unsauced rabbit for entrées and pitied the poor for having no more variety than beans and chickpeas, apples, and dried figs. His unadorned recipes called for herbs and cheese sauce only to rejuvenate a poor choice of fish or one eaten out of season.

Greek table customs separated dining from the *symposion* (drinking), a subject that Athenaeus of Naucratis covered in his 15-volume *Deipnosophistae* (*The Banquet Philosophers*, ca. 190 C.E.). The sharing of food at a banquet emulated the gods of Mount Olympus, who consumed ambrosia and nectar while enjoying table talk and music. After the removal of platters from service, servants passed the *krater* (wine bowl) and pitchers of water for mixing wine with one-fourth to one-half water. During the drinking, diners continued to pass small plates of bar food, varying from nuts and olives to grasshoppers and peas.

Inebriates lost status by imbibing the sacred wine of Dionysus to excess and by behaving in an uncivilized public display, which sober Greeks linked with insanity. As a mark of civility and social order, according to the descriptions of Aristotle, Plato, and Theophrastus, dignified citizens observed manners suited to family and friends as well as to the *xénos* (visitor).

See also: Cereal; Grilling; Poisonous Foods; Poultry; Religion and Food; Theophrastus; Trading Vessels; Veganism; Vegetarianism; Wine; Yeast.

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Greenhouse Horticulture

An artificial means of trapping the sun's heat in the atmosphere of a transparent structure, greenhouse horticulture extends the growing season. Farming under glass forces the propagation of warm weather vegetables and fruits in cold climates from a free energy source.

The Romans introduced the forerunner of the glasshouse, or green house, and heated grapevines and peach trees with bronze hot water pipes and flues that channeled heat from rotting manure. In 30 C.E., Tiberius demanded Armenian gherkins for his meals. Palace gardeners accommodated him by planting seeds in wheelbarrows to place in the sun or by growing vines under sheets of mica or oiled canvas.

In the decades preceding the Italian Renaissance, planters of the first indoor gardens grew tropical exotica and curative plants brought by voyagers from global travels. The concept of frost-free ecosystems appealed to growers in Sicily, the Vatican, Belgium, and the British Isles. In North Africa, the American tropics, China, and Japan, cool houses equipped with automatic misters protected temperate vegetables and fruits from dry winds, dust storms, and sun scorch. Experimenters advanced the notion of producing vegetables out of season by controlling ventilation to facilitate pollination and discourage pests. French botanist Jules Charles de L'Ecluse provided Leiden, Holland, with a greenhouse in 1599 to grow herbs and tamarind, which yielded pulp for a medicinal beverage to treat malaria and scurvy.

Luxuries under Glass

The French and Germans applied hothouse horticulture to lemons, oranges, and pineapples, which they grew in orangeries and pineries. Visitors to the French

royal palace at Versailles admired the massive berry and fruit garden of Louis XIV. To nurture the 350 orange trees of Prince Friedrich V at Heidelberg Castle, in 1619, French engineer Salomon de Caus constructed a shelter with a demountable roof and wooden shutters over four furnaces. Because of low solar radiation, English apothecaries in Chelsea emulated the Heidelberg greenhouse in 1684 with a garden of curative bay leaves and myrtle berries under an opaque roof. To protect seedlings from frost, workers heaped embers in a floor pit.

Improvements to glass and angling techniques resulted in model greenhouses and herbaria in London, Munich, and New York. In Enoshima, Japan, Samuel Cocking planted a botanical garden displaying 165 species. In Boston, Huguenot refugee Andrew Faneuil established a fruit garden in 1737, a forerunner of George Washington's pineapple garden under glass at Mount Vernon and of Tudor Place, constructed for Thomas and Martha Custis Peter in Georgetown, a neighborhood of Washington, D.C., in 1805.

Steam heat reduced the complexities of heating with coal and wood furnaces. One successful glass-and-iron experiment at Kew Gardens outside London began in 1849. The conservatories housed a range of foodstuffs from leeks and turnips to chestnut trees and fruit groves. In 1850, the Dutch began growing grapes under glass in Westland. The addition of under-floor furnaces and mechanical window closing increased productivity of a luxury table grape variety. By 1855, professional greenhouse engineer Frederic A. Lord of Buffalo, New York, erected curvilinear lean-tos and sunrooms to suit individual sites and enhance professional truck gardening.

More Garden in a Smaller Space

Greenhouse horticulture bore new meaning in urban spaces. In 1915, Gilbert Ellis Bailey invented the concept of vertical farming in skyscraper greenhouses that stacked artificial ecosystems on multiple floors. By increasing the productivity of acreage, hermetically sealed gardens promised food for urban areas. Bailey envisioned delivery of fresh goods to neighborhoods without the cost and delay of overland or rail transportation. The invention of polyvinyl chloride in 1920 reduced the weight and construction cost of innovative structures, some erected

atop tall buildings. The concept of maximizing food growth in limited areas appealed to small nations, particularly Holland and Israel.

Growers in Central America, Colombia, Kenya, and Mexico adopted greenhouse gardening as a source of exports. In the United States and Canada, the tomato dominated greenhouse horticulture, by which growers could schedule fruiting and packing and negotiate sale of their produce in advance of planting. In Pittsburgh in 1926, the H.J. Heinz Company selected tomato seeds to grow in greenhouses for its ketchup recipe. The company farmed out plants to contractors who grew the seedlings to maturity and returned ripe fruit high in viscosity, solids, and pectin.

Post-World War II competition in the vegetable and fruit market forced northwestern Europeans to devise new ways to challenge the influx of foods from the Mediterranean. By the 1950s, hybrid cultivars, drip irrigation, recirculated water, acrylic tunnels, and plastic film for home quonset huts increased possibilities for the hobby gardener and university research centers. In addition, biothermal systems reduced the cost of heating by redirecting the methane exuded by decomposing garbage, manure, and vegetable waste. Enclosed ecosystems profited from sequential plantings, which offered restaurants a year-round supply of salad greens and summer vegetables. In Newfoundland, proponents of the local food movement began promoting the economy by harvesting fresh greenhouse produce to sell at farmer's markets and to inns and restaurants.

Small businesses fed the home gardener's need for vegetable transplants, notably asparagus crowns, onion sets, and broccoli, cabbage, cucumber, melon, pepper, and tomato plants. In the 1970s, Tokyo greenhouses yielded marketable cucumbers, eggplant, grapes, oranges, pears, peppers, and tomatoes. In the mid-1980s, Japan led the world in green house use, at 67,499 acres (27,337 hectares), as contrasted with 42,000 acres (17,000 hectares) in Italy and 32,420 acres (13,130 hectares) in China.

High-Tech Greenhouses

In 1999, ecologist Dickson Despommier at Columbia University expanded on the

seasonless garden by allying hydroponics and aeroponics. His variants of in-ground planting yielded beans, corn, herbs, lettuce, and potatoes via the Genesis system, a soilless root enclosure misted with water and nutrients. Trellises relieved root structures of the weight of leaves and fruit. The National Aeronautics and Space Administration (NASA) developed the concept as a cost-efficient means of growing disease-free produce in the low gravity of space stations.

Late in the twentieth century, the geodesic dome altered the boxy glasshouses of the past with latticing that evenly distributed thinner surfaces. In one model, the Plexiglas and aluminum Climatron in the Missouri Botanical Gardens of St. Louis, gardeners tend 400 plant varieties, including bananas, cacao, cassava, chicle, coffee, palms, pineapple trees, rice, and vanilla. The world's largest green house, the Eden Project, opened in Cornwall, England, in 2000. In a complex of plastic domes, engineers reproduced global climate zones.

Complementing the hops, lavender, medicinal plants, sunflowers, and tea of the outdoor garden, the Mediterranean biome produces grapes and olives. Desert and tropical sectors replicate the food-growing atmosphere of the hottest climes.

See also: Agriculture; Local Food Movement; Plant Disease and Prevention; Restaurants.

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[Grilling](#)

The history of grilling parallels the control of fire, a crude method of exposing raw foods to flame that remains a culinary favorite to the present day. After 498,000 B.C.E., humans advanced methods of bringing food and flame together immediately after the hunt. The human direction of heat and light broadened activities to after-dark cookery, which extended the usability of raw game. To enhance the reach and grasp of human fingers, inventors shaped the long fork and tongs. Fire cookery provided hunter-gatherers with additional calories from easily chewed meals to sustain humankind during the initial stages of settled life. The circular nature of cooking fires and the gratifying nature of grilled food loosened tongues for chants, songfests, and storytelling, elements of natural human loquacity.

Mongol horse men embraced grilling techniques because they required simple equipment for turning gamy venison into a palatable meal. Fireside cookery involved elemental methods of transferring flame to meat, beginning with the heating of stones to stuff into carcasses and insert external cookery into inner tissues. Condiments began with bags of salt granules for rubbing on haunches and organ meats and developed into dry rubs and spice pastes creamed from individualized blends of wild herb fronds, leaves, and roots and lubricated by sizzling animal fat.

The union of sensual pleasures—sound, fragrance, browning of ingredients, and the resulting taste and texture—endorsed a cooking method that spread south as far as Burma, Cambodia, Laos, Thailand, and Vietnam. To the west in India, the use of the tandoor, a large clay jar, adapted from Arab cookery. Each required long hooks for suspending meat, which contrasted the horizontal gridiron cooking common farther north. For fish, the preparer placed a gridiron over the mouth of the tandoor.

Grate and Gridiron

From 2000 B.C.E., the biblical Hebrews placed gridirons over coals for heating cereal paste into flatbread. Homer speaks at length about ritual beasts, which sacrificers grilled on bronze tripods, a standard prize for athletic prowess. In the post-Homeric era in Egypt and Greece, the sea bream that came to the table with

split peas and red lentil soup received its tasty crust and juicy, nutritious meat from live-fire grilling on a footed grate. In *De Diaeta (On Diet)*, ca. 410 B.C.E.), the physician Hippocrates of Cos, known as the “Father of Medicine,” described beneficial cookery as the dehydration of wet foods, such as anchovies, eggplant or turnip slices, sardines, and smelts, by grilling and roasting. Around 350 B.C.E., the Sicilian poet Archestratus added his own praise of grilling by discussing how easily he prepared bonito, a popular fish among the Turks, who flavored it with clove and oregano.

The Romans adopted Greek grilling styles, which antiquarians have analyzed at Paestum and Pompeii and at Roman enclaves in Britannia and North Africa. For small-portion grilling, such as dormice and songbirds, they selected a special grate. Slaves raised birds in home pigeoncotes and prepared them for cooking by plucking, gutting, halving, and flattening with a mallet. After grilling, the bird required a roll in chopped parsley or thyme to flavor the succulent skin. Apicius’s *De Re Coquinaria (On Cookery)*, ca. 35 C.E.) applauded the era’s open-fire innovations, including gridirons for shipboard cookery and the home grilling of beans to prevent intestinal fermentation and gas.

Medieval cookery required the maneuvering of heavy boar and deer over fireplace grates for carving and service to aristocrats and clergy. In the early sixth century, the Empress Theodora supervised the kitchen of the Emperor Justinian the Great, in which chefs from Greece, India, Persia, and Syria presented a three-course fare, beginning with lightly grilled appetizers. The menu featured Byzantine comfort food—grilled sea bass and sturgeon—and added griddle bread and a dessert. Wood fires began in winter with olive wood and in summer with orchard and vineyard prunings. Aromatic herb blends in water simmered in a pan nestled in the coals. Bubbling liquids generated a flavorful mist to flavor and tenderize meats and to lure diners to the final moments of meal preparation.

In Japan around 710 C.E., Zen Buddhist vegetarians based their diet on seasonal produce and nonmeat grills, specifically tofu, which released the meatlike tang known as umami. The Japanese developed *yakitori* grilling, a partial cooking of bitesize *momo* (chicken, beef, or fish pieces) interrupted by brushing with marinade or plunging bamboo skewers into an earthenware jar of sauce. The cook finished the tidbits with a deep char to deepen a glossy brown crust and the

sensuous aroma of double caramelization. Tending the grill required constant shifting of portions between hotter and cooler sections of the rack to protect foods from overcooking.

In the 900s C.E., Scots grilled dulse, a red alga known as sea lettuce. In Baghdad, Syrian chefs grilled red meat kebabs and spit-roasted whole lamb with a garlic marinade over a low charcoal flame. Jordanian and Lebanese cooks raised *masgouf*, a butterflied carp, over an upright grill, which burned out the fish fat. In 1071, eastern Turks abandoned more complicated recipes for intense meat flavors—freshly slaughtered lamb roasted or grilled over hot coals. Along the Silk Road at Xi'an in central China, Arab and Bactrian merchants introduced Turkish-style skewering and grilling methods to Chinese cuisine. In Beijing's streets in the 1100s, vendors grilled lamb and mutton in the open air. Shoppers strolled while nibbling the fragrant meat wrapped in wheat pancakes.

Ögödei Khan's Mongol invasion of Korea in spring 1231 brought soldiers who grilled their suppers over campfires and flavored the meat with black pepper. In the 1300s, Mongol nomads added to Chinese menus *kao* cuisine, meat threaded on iron rods and charcoal grilled. On tabletop grates, diners joined in casual roasting of morsels to individual tastes in doneness. Farther east, Japanese recipes named grilled curd as a popular tofu recipe. In 1375, Taillevent, the Norman French master of late medieval cuisine, described how grillers soaked brochettes to inject woody flavors into the meat. He favored dorade, eel, salmon, shad, sole, and tench, which cook in 20 minutes over a low fire.

New World

The Western Hemisphere astounded European voyagers with evidence of grilled human flesh. In December 1492, Christopher Columbus witnessed West Indian Arawak and Carib pitmasters barbecuing arms, legs, and organ meats on a green wood rack, a source of aromatic vapor. During slow cooking, clouds of smoke ward off insects and halted decay by dehydrating tissues. On Hispaniola, grillers blistered peppers over a rack and hustled into place whole cow and pig carcasses, which butchers split for maximum exposure to heat and smoke. Pacific Coast tribes grilled their most common foods—acorn bread, quail, rabbit, seafood,

and venison. When the Californios adapted native cookery to their own use, a favorite dish, *frazada*, involved the rapid salting and heating of the meat covering beef ribs, which they lopped off and devoured almost raw.

In Central America and southeastern Mexico, the Maya preferred iguana and turkey on the gridiron. According to Spanish conquistadors, Mexican grillers in the 1500s specified mesquite coals for flavoring *barbacoa* (barbecue) and *carnitas* (roast meats). Simultaneously, they heated corn-on-a-stick, a finger food grilled by the pre-Hispanic Aztec. Argentines mounted a *parrilla*, a wooden framework that accommodated tongue, tripe, and whole carcasses over radiant heat. The portable frame suited impromptu fiestas and religious celebrations, whether over an outdoor fire or a stone pit.

The Modern Era

Upon her arrival in France in 1533, Catherine de' Médici introduced Italian recipes for grilled songbirds, a delicacy unknown to northwestern Europeans. Because of her example, chefs rid high Renaissance menus of unwieldy meat joints and substituted a medieval Venetian treat, individually sized *ucelli*—small blackbirds, larks, thrushes, teal, and warblers—sauced in light broths and herbs. To ready fish or poultry for rapid heating, butchers butterflied the carcass, a gutting and flattening that simplified the arrangement of a Cornish hen or filet of sole on a gridiron or the threading of a duck on an iron rod. The geometrics of an iron grill branded a finished bird or fish with a lattice pattern blackened into the skin.

From the seventeenth century, grilling history evinced a flair for the unusual. Elizabethans sliced and scored sheer carbonadoes of mutton shoulder for quick scorching on the grill and dressing with garlic, onions, and vinegar. Brazilians devoured grilled devils on horseback—dates or pitted prunes stuffed with green mango chutney and wrapped in bacon. Indonesians added savor to grilled lamb with cashew and ginger sauce. South African cooks grilled bananas for chopping into relish. Australian Aborigines survived on a found diet of crocodiles, snakes, and witchetties, a large white grub easily grilled into bitesize snacks. In this sameera, Ottoman travelers to Erzurum, in eastern Turkey, filled pitas with lamb

carved from a *cag kebabi*, a horizontal spit that impaled carcasses for grilling and basting with onion sauce.

West Indian barbecue popularized the metal rack, trendy equipment erected over a charcoal or wood fire for low temperature grilling of Jamaican jerk snapper drenched in pineapple juice and enlivened with a sluice of allspice, cayenne, and hot pepper sauce. Atlantic Coast grillers focused on rustic goods—braised apples with cheddar cheese and maple syrup. In the North American wild, a grill simplified the cooking of dressed squirrel. Cajun cooks favored marinating and grilling for crawfish, shrimp, and tasso (pork shoulder), a fatty cut that developed taste from a sugary salt cure and hot smoking with cayenne pepper, cinnamon, garlic, and paprika. Tidbits of grilled tasso offered its complex flavor to gumbo, jambalaya, and red beans and rice.

On the American frontier, wranglers preferred beef brisket as well as beef, goat, pork, and venison for grilling. Developing skills from colonial hearth cuisine, chuck wagon “cookies” suspended heavy lidded pans and gridirons over campfires at variable heights, depending on the tenderness of the meat, the butchery style, and the method of readying it for consumption. The finishing touch, the sauce, gave the griller leeway to select from Alabama white sauce, Asian five-spice rub, Carolina vinegar-and-tomato sauce, Creole rub, Jamaican jerk, Kansas City sweet sauce, Lebanese and Memphis dry rub, Louisiana hot sauce, Mexican chili rub, Provençal paste, and red wine marinade. The most popular along the Rio Grande, Texas mop sauce, a thin brown gravy spiced with local ingredients—ancho powder, beef drippings, beer, chili, cumin, dry mustard, green pepper, and onion—penetrated the meat and replenished moisture.

During the Victorian era, the middle-class English emulated the royal family’s togetherness at “heavy breakfast,” sometimes called a “British breakfast.” Housewives and their cook staffs spread the sideboard with an Ulster fry-up grilled on a buttered long-handled gridiron or an iron rack greased with suet. The morning menu offered grilled, self-serve black pudding and oatcakes, mushrooms and tomatoes, kidneys or kippers, link sausage or mutton chops, liver or rashers of streaky bacon, and marmalade and mustard for dressings.

A handy kitchen gadget, the hinged gridiron held together tender morsels of mushrooms and sprats, small oily fish. A hollowed gridiron offered grooves for directing fat and gravy back toward the handle to prevent drippings from

leaching out into the fire and causing a smoky blaze. Less affluent cooks grilled their morning oysters or herring snacks over a plain four-bar gridiron, a common metal kitchen device that Alexis Soyer characterized in *A Shilling Cookery for the People* (1854).

In the 1890s, French chef Auguste Escoffier, the “Father of French Haute Cuisine,” ranked the *rôtisseur* above the *grillardin*, the preparer of grills and roasts, but Escoffier’s dictum ignored the global diaspora that brought ethnic grill cookery to new venues. Before World War II, food maven Elizabeth David, a British expatriate, sampled Nile-side specialties—quail kebabs and charcoal-grilled pigeon, quick-cook meats that retained natural meatiness. Her promotion of sidewalk café gastronomy preceded the American adoption of Japanese *yakitori*, a postwar favorite.

The Contemporary Griller

James Beard’s *Cook It Outdoors* (1942) introduced camp cooking and grilling as one of the most appetizing methods of preparing meat. He considered grilling serious cuisine based on scientific principles, such as completing the roasting of chicken hearts on all four sides, the quick charring of flank steak for sandwiches, or the crisping of cocktail franks for dressing with mustard and sour cream. His philosophy proved prophetic of the postwar boom in urbanism.

With city life came backyard grilling, boating, camping, and picnicking on hamburgers and hot dogs. George A. Stephen, a Chicago welder who manufactured harbor buoys, caught the attention of home barbecuers with the Weber kettle grill, a lidded half buoy on legs. First marketed in 1952, the spherical container for a rack suspended over charcoal offered the backyard chef more control of heat and smoke and a lid that prevented ash from blowing into the meat.

Cycles of grilling trends in the 1900s illustrated the method’s versatility, even extending to popcorn. One of the innovations in heating, charcoal briquettes, was the brainchild of automotive mogul Henry Ford, who, in 1921, recycled the wood scrap from a car factory. In the 1950s, Australians and New Zealanders gave up formal English meat service and embraced barbecuing for special occasions by

grilling game or skewered chicken, lamb, and sausages. In the 1960s, food faddists created a demand for technologically advanced barbecue grills, a departure from the common small cast iron Japanese hibachi and flimsy wire and sheet metal braziers. In Little Rock, Arkansas, Melton Lancaster and William G. Wepfer reengineered the charcoal grill to accommodate natural gas as fuel for the fire.

In the post–World War II era, after the arrival of Cuban émigrés, Floridians popularized the pressed Cuban sandwich, a grilled Swiss cheese and ham with mustard and pickles on sweet *pan cubano* (Cuban yeast bread). Mexican cuisine made use of the opuntia *nopales* (cactus paddles) pickled or deep-fried with chili and cumin as accompaniments to a grilled ratatouille. From Austin and Houston, Texas, in 1973, the standard Tex-Mex entrée menu showcased fajitas, a sizzling plate of marinated skirt steak with grilled peppers and onions. Korean restaurants offered table barbecuing of short ribs over a small grill. The Taiwanese grilled corn on a skewer and embellished it with cayenne, garlic, onions, and soy sauce. Late in the twentieth century, grilled quesadillas boosted lunch choices from ho-hum chef's salads to an enticing grilled cheese sandwich served with charred corn on the cob, jalapeños, and lime quarters.

See also: Barbecue; Beard, James; Caribbean Diet and Cuisine; Kebabs; Nouvelle Cuisine.

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Gruel

See Pulses

Guar

An annual legume, guar remains in demand for producing a high-viscosity gum that stabilizes processed foods. Known as the cluster bean, or *Cyamopsis tetragonolobus*, the high-protein guar bean is a forage crop for livestock. A green manure grown in Africa, Australia, China, northwestern India, and Pakistan and in Arizona, Kansas, New Mexico, Oklahoma, and Texas, the plant supplements depleted fields.

By husking, milling, and gelling the nearly tasteless endosperm in water, processors reduce powdered beans into a digestible, odorless guar gum. The colloid solidifies cream cheese and cold cuts and emulsifies and suspends solids in ice cream and sherbet to prevent crystal growth and ingredient settling. Food producers value the mucilage for suspending starch in liquid and for ameliorating the effects of freezing and thawing.

Because guar gum has eight times the thickening agency of cornstarch, it binds liquids and retains moisture in baked goods to extend shelf life. The versatile powder volumizes barbecue sauce, cereal, dough, dry soup, icing, instant oatmeal and pudding, ketchup, pastry filling, popsicles, orange juice and fruit ades, pet food, relish, salad dressings and marinades, sports drinks, and whipped cream. Aficionados sprinkle guar on berry pie fillings and whisk it into pan juices to make gravy. In gluten-free recipes, the powder thickens with soluble fiber granola and smoothies as well as bread, piecrust, and pizza dough. In milk and yogurt, like the action of pectin in jelly, guar gum maintains homogeneity.

In 1983, British biochemists created a high-fiber, low-starch bread. Sold in Holland, Scandinavia, and the United States as Wasa Crispbread, the formulation controlled appetite and cholesterol while emulating the mouthfeel and satisfying quality of ordinary bread. Five years later, weight-reducing compounds touted guar powder as a breakthrough in dieting.

After millennia of use in central Asian pharmacopoeia, guar has established its worth to alternative and complementary Western medicine. The bean serves the human diet as a table vegetable, a treatment for childhood enteritis, and a control of irritable bowel syndrome and obesity. It also is an ingredient in some diabetes drugs.

See also: Dairy Food; Ice Cream; Ketchup.

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H

Halal

According to Muslim law, food choice and preparation divides ingredients into two distinct categories, *halal* (permissible) and *haraam* (forbidden). From the beginning of the faith, the devout followed godly proscriptions contained in the Koran, the sacred work compiled by followers of the prophet Muhammad in 652 C.E. For the sake of unity, Muhammad encouraged piety and cultural conformity.

As instructed by scripture, Islam's early followers avoided selling or consuming alcohol, amphibians, birds of prey, blood, carrion, insects, sacrifices from foreign altars, and some cheeses and gelatins. Like Jews, Muslims rejected pork, which the Koran excluded from the table as an unclean meat. In one doctrinal difference of opinion, Shi'ite Muslims rejected shellfish, which Sunnis considered edible. In dire situations, starving people received forgiveness for eating forbidden food.

For details and clarification, readers of the Koran studied the *hadiths*, the Prophet's pronouncements concerning everyday behavior. Ritual slaughter of healthy beasts by a Muslim butcher began with an invocation to Allah. A quick slice of the throat avoided suffering. Scripture grudgingly allowed the meat of predatory animals, snakes, and eels as *makrooh* (unwholesome but allowed). To prevent contamination, the faithful avoided eating from kitchens that produced both permissible and unlawful dishes, such as blood sausages or carnivorous bushmeat.

Muhammad was wary of cheese and grapes but advocated the daily consumption of dates. To the Muslim cook, he dictated that food should be thoroughly cooked, kept covered, and cooled before serving. He advised diners to eat only when seated and to leave the table without filling the stomach. He also instructed his followers to walk after eating, a therapeutic aid to digestion.

Shopping for foodstuffs among imported goods extended approval to meats slaughtered and dressed by Christians and Jews. The removal of blood from meat

required soaking in vinegar. To ensure cleanliness, the cook heated meats to full doneness to prevent the appearance of blood. Cooks replaced wine in recipes with vinegar and sour fruit juice and continued the tradition of sautéing raisins to remove the risk of fermentation. They cleverly circumvented the injunction against drinking alcohol by first boiling it. Because coffee, opium, tea, and tobacco were vegetable stimulants, they fell into the category of halal.

In the 1920s, the Nation of Islam, led by African-American preacher Elijah Muhammad, reinterpreted injunctions to the advantage of sect food businesses in inner cities, including Steak-n-Take and Whiting H.&G. Simplifying questions of dining out for Muslim travelers, caterers and restaurants posted certificates of cleanliness and obedience to holy injunctions.

In the early twenty-first century, African-American Sunnis adapted standard halal fare to accommodate Southern soul food—black-eyed peas, collard greens, fried chicken, kebabs, macaroni and cheese, and okra. U.S. Muslim immigrants from Africa, Bosnia, and India contributed to the diversification of the halal diet. Some devout diners compromised by observing halal cookery and marketing, which is increasingly available (see image on page 270), but eating out at fast-food chains. Advocates for American Muslims published guidance on combating diabetes, high blood pressure, and obesity by avoiding foods high in fat, salt, and sugar, the hazardous cuisine associated with slavery.

See also: African Food Trade; Alcoholic Beverages.

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Hanna, Gordie C. (1903-1993)

A hero to produce growers, agronomy professor Gordie Consyntine “Jack” Hanna developed a tomato that could survive mechanical picking, thereby revolutionizing the industry.



As Arab peoples emigrate in growing numbers, halal foods, or those deemed permissible under Islamic law, have become increasingly available in the West. For meat to be halal, slaughterers must bleed and process carcasses according to a prescribed method. (Elise Hardy/Gamma-Rapho/Getty Images)

A native of Quannah, Texas, Hanna was born on July 1, 1903. From 1929 to 1933, he worked in crop research at the Ryer Island Field Station. He advanced to lecturer in olericulture (truck crops grown for city markets) and issued numerous monographs, beginning with *Asparagus Production in California* (1935) and *Crown-Grading Experiments with Asparagus* (1940).

The need for faster, less invasive, mechanical tomato handling derived in 1941 from a war time dearth of migrant Mexican field labor. After the University of California at Davis invented a tomato-picking machine, the device disappointed the agricultural engineering department with its rough handling of delicate fruit.

In 1942, on staff in the Vegetable Crops Department at Davis, Hanna began hybridizing a small, high-yielding tomato with a firmer skin and more fibrous pulp, a elongated crossbreed of the Gem and San Marzano varieties known as Red Top. He walked his test fields selecting cultivars of 2,000 varieties to toss into Hutchison Drive adjacent to the campus to observe their durability for transport by truck. An initial problem with susceptibility to fusarium and verticillium wilt made colleagues believe that Hanna chased a faulty ideal. He proved them wrong with the VF145 A & B, two resilient varieties of the blockshaped tomato that would remain on conveyor belts during sorting and packing.

Hanna's hybrid accommodated picking at the peak of ripeness for cooking and peeling. It held an intense red hue suited to ketchup and pasta sauce. In 1951, he retired from teaching and joined Petoseed, one of the world's largest vegetable seed companies. Because of its rapid and simultaneous setting of fruit, the VF145 tomato became available from the Castle Seed Company. With dependable traits, it succeeded in the products of Campbell's, Heinz, Pizza Hut, and Unilever.

In 1961, Hanna and agricultural engineers Coby Lorenzen and Istvan J. Sluka refined a method of picking tomatoes that required nine patents. The machine plucked the entire plant and deposited its fruit on conveyor belts for sorting and culling. Made by Blackwelder Manufacturing, the machine reduced harvest time by nearly 50 percent and increased California's tomato crop from 7 percent of the state's acreage to 85 percent.

Hanna and Lorenzen published their findings in January 1962 in *Agricultural Engineering*. Within three years of the demise of the Bracero Program—a federal contract laborer program for Mexicans from 1942 to 1965—more than 80 percent of U.S. tomatoes derived from machine harvesting. Mechanization put the small grower out of business and reduced planting in the Midwest, where picking machines balked at crossing boggy fields or topping hills. By 1970, no commercial grower picked tomatoes by hand. Farmers ceased hiring *braceros* and employed local women to stand on the picker machine platforms.

Hanna's improvements shifted tomato growing and its profits to California. The reduction in farm labor dropped prices by half and increased agrarian yield in a \$3 billion industry. Hanna, Lorenzen, and Sluka shared the 1976 John Scott Award from the city of Philadelphia for improving human comfort and welfare. In 1981, Hanna and Lorenzen won the Cyrus Hall McCormick Medal. Hanna

continued aiding farmers by improving strains of broccoli, cabbage, and sweet potatoes, as well as disease-resistant asparagus.

See also: Hybridization.

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Hardtack

See Biscuit

Haute Cuisine

A product of the early 1800s, haute cuisine introduced the European elite to fine dining, professional service, and elaborate tableware in upscale hotels and restaurants. Shortly after the emergence of the upper class following the French Revolution of 1789, Marie-Antoine Carême, a chef to British, French, and Russian royalty, refined European gastronomy with the best of exotic ingredients from around the world. The wealthy looked to him to create status dishes to enhance their prominence at receptions and state dinners in grand halls and châteaux.

Because sumptuous food spectacle became a measure of social class, Carême catered to poseurs and social climbers as well as the truly genteel. To heighten gustatory expectations, he named his recipes for aristocrats and devised dramatic

presentations that intermingled aroma, taste, and texture with visual effects, notably stuffed peacock, saumon à la Neptune on a pedestal, and candied fruits suspended from limbs. At his death in 1833, his five-volume encyclopedia for food professionals, *L'Art de la Cuisine Française* (*The Art of French Cuisine*, 1833–1834), remained unfinished. Subsequent cookbooks and cooking journals extended his codification of the best in dining.

Because of Carême's influence on Continental cooks, the French maintained an intimidating presence in gastronomy and a reputation for unequalled taste and table style at such classic restaurants as the Grand Véfour, the oldest in Paris. Americans boasted their own showcase recipes at Chicago's Palmer House and Delmonico's and the Waldorf-Astoria Hotel in New York City. Piquing the interest of the American nouveau riche in the Gilded Age, the cultural commentary of Henry James for *Atlantic Monthly*, the *Nation*, and the *New York Tribune* in such vignettes as "Occasional Paris" (1883) and "An International Episode" (1892) began the rush of North American imitators of refined fare.

In 1890, French chef Auguste Escoffier, the "Father of French Cuisine," brought Gallic flair to the Savoy Hotel, newly opened in London. His discipline of the kitchen brigade generated order and dignity in the preparation and presentation of hearty dishes sauced with a distinctive béchamel or velouté. His phalanx of kitchen officers specialized on separate courses—the *garde manger* over cold food, the *entremetier* over soup and vegetables, the *rôtisseur* over grills and roasts, the *saucier* over sauces and *fumets* (scented additives), and the *pâtissier* over pastry.

With the aid of hotelier César Ritz, Escoffier quickly turned English nobles into aficionados of haute cuisine. The Michelin Guides increased the notoriety of luxury hotels in 1900 by listing the toniest service, which was available at exorbitant prices. Escoffier further standardized the artistic menu by publishing *Le Guide Culinaire* (1903), a touchstone of Gallic food philosophy.

The posh style of cookery depends on formality and artistic form. From the folding of napkins and the curling of butter to service of the finest postdinner Mocha coffee, haute cuisine calls for attention to detail. Menus favor cassis aperitifs (predinner drinks) and foie gras (goose liver) and snail appetizers preceding citrus sorbet to clear the palate. The height of haute cuisine resides in heavily garnished and sauced beef, fish, and poultry.

Recipe: Salmis of Pheasant

Roast a pheasant to slightly rare and dismember. Skin and trim pieces. Reheat meat in a covered pan with clear drippings and ½ teaspoon of burned brandy. Pound the carcass and trimmings and simmer in 1 pint of red wine, three chopped shallots, and ½ teaspoon of peppercorns. Simmer bones and skin with ½ cup of brown sauce made from beef stock, vegetables, bay leaf, butter, and flour. Sieve and filter the sauce twice. Add butter to the sauce and marinate the bird pieces. Top with sliced mushrooms and truffles.

Notable meats involve ox cheek, frogs' legs, dolphin and porpoise, and veal tongue served with the appropriate garnishes and wines. Lengthy meals conclude with mousses, pastries, and soufflés, petits fours, a cheese tray, and a dessert wine and cognac.

See also: Carême, Marie-Antoine; Dairy Food; *Larousse Gastronomique*; Marshall, Agnes; Poultry; Restaurants; Tofu.

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Health Foods

See Curative Foods

Hearth Cookery

A technique from earliest times, hearth cookery provides a flexible means of applying heat to raw foods, including boiling, stir-frying, and ash baking. Both indoors and outside, fire keeping begins at ground level with flaming fuel and heat radiating from coals. Stone Age cooks developed sophistication with types of fuel—camel dung, charcoal, peat, pith, pine bark, dried seaweed—to determine which produced the most reliable and controllable fire. In North America, they supplemented the best hardwoods, hickory and oak, with more readily available woods, such as ash, beech, birch, fruitwood, locust, and maple.

Fireside cookery dominated Lapp camps, Bedouin tents, Mongolian yurts, Celtic raised hearthstones, and Sicilian cave sites, creating a sense of unity and hospitality for clans. The early Romans, Chinese, and Pueblo Indians halted from serving hearth meals to feed a bite to the household gods, deities they shared with Greeks, who named their home goddess Hestia, or “hearth.” In Malaysia, the term *hearth* also meant “extended family,” a personal and historic reference to the spread of Pacific Island food customs from Fiji, Samoa, and Tonga throughout the region.

In addition to cooking foods, the hearth warmed bodies and enabled hunters to dry hides for clothing and blankets. The Japanese *kotatsu* was a wood frame over a sunken hearth in the floor. From the 1300s, families huddled at the edge and warmed their feet on the pot filled with charcoal that they had used to cook their dinner. A quilt covering the frame and hearth kept the heat from dissipating. For the Irish, tunnels called “shores” circulated air under slate floors. Sliding wood baffles increased or reduced the flow of outside air feeding hearth fires. Back wall “keeping holes” served as storage niches for drying vegetables and fruit and for warding off dampness in the salt box.

Children required reminders of hot handles and popping coals; adults were treated for burns and scalds if they got too close to the open flame or boiling

liquids. The concern for burns caused house wives to become adept at stirring up salves as treatment for the second-greatest cause of death after childbirth. Thus, gendered chores inclined women toward child care, hearth management, cookery, and healing—the four areas of expertise expected of females. In 1845, New Brunswick pioneer Frances Beavan declared that colonial prosperity relied on women’s hearth skills.

Fire Keeping

Fire builders sorted burnables into pine cones, branches, and splits and chips of wood for a quick, hot blaze and placed limbs and backlogs atop fire dogs (andirons) for the slow production of hot coals. They experimented with varied equipment by roasting fish on slabs of aromatic wood, heating stones to boil soups or porridges in the paunches of animals, roasting tasty bits in shells or on forked sticks, sauteing garlic in an iron wok, baking dough on convex stones, and fashioning clay pots to perch on brick or stone tripods to hold boiling meats and one-pot stews. Above the hearth, rising heat dried and cured preserved goods—strings of beans and peppers, bags of chestnuts and peanuts, braided onions, loops of pemmican, bunches of herbs, and round slices of pumpkin and winter squash. On plantations, slave cabins as crude as those at Boone Hall Plantation outside Charleston, South Carolina, contained small versions of residential fireplaces called half rounds, a brick semicircle on a dirt floor that lacked the chimneys and iron equipment of the main house.

Each stage of hearth tending impacted family well-being, even the removal of ash, an essential in soap making and fertilizing a vegetable bed in the colonial era. For Canadian Mennonites, the heating of traditional apple butter and spiced cider and the scalding of milk for soft cheese required control of fires by avoiding the burning of pine, poplar, willow, and other quick-burning softwoods. Several small fires aided the cook in controlling heat for the delicate tasks of coddling eggs and congealing a custard. For extra light while doing meticulous handwork, such as sausage making and potting jam, housekeepers kept pine knots soaking in turpentine, which burst into a bright flare.

Daily, the homemaker kept water heating for utilitarian uses—washing dishes,

scrubbing hearthstones, rinsing seafood, and dressing game. Grueling labor strained the back with constant stooping and lifting. At bedtime on the frontier, a layer of coals under a soil and brush mattress kept bodies cozy, even in snowy weather. Cooks used leather thongs to bind haunches of meat and truss birds to keep the meat from falling from the bone into the fire. Experience with broth, herbs, oil and salt encouraged new flavorings and the formulation of eighteenth-century recipes, which they shared by word of mouth.

Sophisticated Cookery

More complex kitchen methods required the rotation of pots for even cooking inside and the elevation of wood racks for smoking, drying, and barbecuing. Hearth tenders learned to rely on the senses—the smell of roasting venison, the sound of frying catfish, the feel of coal-baked sweet potatoes, the appearance of bubbles in maple syrup and glaze on strawberry fruit leather. The skilled cook enhanced the simple one-pot method by setting colanders on top of soup for steaming a dish of mashed turnips or by topping the stew pot with a flat lid for baking drop biscuits to accompany the meal. Juggling, a parallel of the bamboo steamer and the bain-marie, began with the suspension of a smaller container by a thong from the handle of a cauldron to cook a second dish in the heat radiating from the main dish. Thus, the cook could steam dumplings Cantonese style or complete a shore dinner of roasted potatoes and corn with clams steamed in seaweed.

One of the first advances involved the elevation of the hearth above floor level to provide a ledge for preparing pots of food and to ease the hardships of reaching down to a fireplace to move containers nearer or farther from the blaze.

The arrival of Europeans in the Western Hemisphere in the late fifteenth century introduced native peoples to ironwork, a major advance over clay for the sturdiness of containers and their handles and trivets. English and Spanish cooks introduced Indians to griddles, Dutch ovens, drip pans, long-handled tongs, spiders, rotating spits, and closed kettles, all advances over native kitchen gear. A clockwork or clock jack saved labor by turning spits with a regulated system of weights and pulleys.

Seventeenth-century engineering of the flue and brick or stone chimney rid the hearth of smoke and soot. The creation of the hob and inglenook, a built-in shelf and offset from the fireplace, allowed the user to vary temperatures and hold pots of tea and hasty pudding at a low temperature until their service at table. Blacksmiths made the cook's work easier and more exacting by supplying a variety of iron attachments and niceties, from pokers, ember shovels, and prongs used to hold roasting ears or yams to griddles for baking oatcakes and wafer irons for toasting sweet crackers and waffles. A salamander, a disc on a long handle, radiated heat directly above apple slump and twice-baked potatoes for browning. Nails on and below the mantel kept utensils at hand. The handiest technology, the damper, allowed the cook to control the airflow up the chimney and to feed or starve the fire of oxygen, depending on need.

Cranes attached by Shooks to a pivot or pot chain swung the boiling food nearer or farther from the fire. Lug poles installed in the chimney secured iron trammels and adjustable hooks for raising and lowering frying pans. Reflecting ovens called "tin kitchens" extended hearth cookery to the outside of the fire and made use of radiant heat for baking muffins and pigeon pie. Some hearth ovens contained rotisseries for pheasant and duck roasting. The ovens produced moister meat with a savory caramelized crust basted in natural juices. Alongside the hearth, stores of emery rock, pumice, or sand provided the scouring grit to remove burned-on food. By the 1840s, cast-iron cookstoves began replacing hearth work in all but the most isolated coves and backwoods, including the sheep camps of Australia.

The hearth remains a feature on tours of historic sites at Grasshopper Pueblo, Arizona; Henry VIII's home at Hampton Court in London; and Monticello and Williamsburg, Virginia. At Old Salem, the Moravian stronghold of North Carolina, visitors can observe the use of a brick and soapstone wall bake oven capped with a roof. Masons insulated the baking chamber and equipped it with fireplace and smoke hood. A rear and bottom exhaust rerouted smoke to the oven top in a design the Amish dubbed a "squirrel tail." To test temperatures, users cast a handful of cornmeal on the stone floor and calculated, by the feel of heat on the hand and arm and how long the cornmeal took to burst into flame, before they slid in loaves and pans of cookies on a wood peel.

Beyond the two-and-a-half-story main building at Mount Vernon, Virginia,

George and Martha Washington's kitchen served the nation's first couple as a culinary command post. A slate-floored room with modest fireplace at one end, it offered triangular niches at each side of the chimney for keeping dishes warm and suspended copper molds and brass warming pans and ladles. The cooking area itself broadened inward from a brick hearth. An iron bar topped the fire chamber; pots and kettles clustered at the hearth attest to the constant use of embers and the adjacent bake oven, which is bricked into the wall at right. The hearth regularly turned out fare for 240 residents plus guests.

See also: Cantonese Diet and Cuisine; Literature, Food in; Medieval Diet and Cuisine; Pennsylvania Dutch Diet and Cuisine; Roman Diet and Cuisine, Ancient; Tudor Diet and Cuisine.

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Heirloom Plants

A revolt against industrialized monoculture and a shrinking gene pool, the heirloom plant movement introduces to the food chain a wide variety of native fruits, grains, and vegetables that once graced the human table. The term *heirloom* derives from the historic and sentimental value of organic foods trea

A retail outlet in Petaluma, California, offers a variety of heirloom seeds, handed down by tribe and family members to grow native, nonhybrid plants and vegetables. Heritage horticulture is part of the explosion of interest in locally grown organic foods. (*Ben Margot/Associated Press*)

The years immediately following World War II mark the rise of industrial agriculture. With it came intense hybridizing that modified open plant and seed stock to produce bioengineered commercial varieties that replaced Austria's vineyard peach and the Chilean white strawberry. Consequently, while richer nations now limit themselves to select plants, preindustrial countries retain the most food variety, such as nutritionally rich Chinese black rice and the red rice of Bhutan, both marketed by Lotus Foods in El Cerrito, California. The company aims to sustain global farming by isolated growers who preserve traditional heirloom seeds and cultivation methods, such as the production of *kaipen*, a dried algae produced in northern Laos. Nutritionists support the revival of heirloom foods for their antioxidants and for their impact on reducing poverty in agrarian cultures.

Throughout Europe since the 1970s, the regimented list of commercial foods insists on distinct varieties that are uniform and stable rather than such insect- and wind-pollinated plants as Tuscan dinosaur kale and French blonde peas. Rules limit the sale of Dutch white beets, German Hori onions, Kentish cobnuts, Portuguese Ermelo's oranges, Spanish Denia raisins and Ganxet beans, and other heirloom produce. Over time, fewer people raise the meaty San Marzano plum tomatoes integral to pasta sauces and the Long Horn okra that remains tender to the length of 8 inches (20 centimeters). In the United States, a similar winnowing out of food types in the late 1990s reduced the 1900 list of vegetables in the Department of Agriculture catalog by 97 percent.

In defiance of such regulation, botanists have established heirloom arboretums and seedbanks, cold storage facilities such as the Svalbard Global Seed Vault in Spitsbergen, Norway, and the Millennium Seed Bank Project in West Sussex, England. Preservers select, type, and store ancient cultivars for the sake of biodiversity. The concept also preserves dormant varieties of the past as a hedge against catastrophic war, epidemic, or natural disaster. Seeds that degrade from dry storage, such as avocado, cocoa, lychee, and mango, require constant replacement to save them from extinction.

See also: Agribusiness; Commodity Regulation; Heritage Foods; Kitchen Gardening; Local Food Movement; Monoculture; Seed Trade.

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Herbs

The boost to flavor, scent, and texture from herbs elevates mere cookery to an art. From prehistory, cooks have associated herbs with taste as well as health and longevity. Classical Greeks and Romans took herbs seriously and elevated verbena to a sacred realm. In the third century B.C.E., the poet Theocritus, a Greek colonial living in Syracuse, Sicily, wrote verse on the good life, which he equated with rural produce. In his *Idylls* (ca. 270 B.C.E.), Theocritus pictured himself garlanded and sipping on aged wine by the hearth while waiting for the cook to finish preparing his beans. Meanwhile, he reclined near fleabane and asphodel mingled with wild celery. The image reflects comfort in the texture and fragrance of green herbs, which rid the house of vermin and cleansed the air.

The basics of a kitchen herb garden called for a variety of greens and culinary plants for cooking, home needs, brewing, and curing meat. The term *herb* remained so valuable to cookery that it characterized vegetables (pot herbs), salad greens (sallet herbs), flavoring (sweet herbs), and simples, compounds of healing herbs for teas and compresses. By the seventeenth century, the drift toward enlightened medicine ended dependence on herbs for cures. Instead of dosing

growers with plants, humanist and kitchen gardener John Evelyn, author of *Acetaria: A Discourse of Sallets* (1699), characterized the bud, flower, seed, leaf, stalk, and root of 73 salad plants and determined whether to blanch, chop, pickle, steam, or steep each for the table.

One rebel went to the extreme to refute late Renaissance medicine. American president Thomas Jefferson, an influential disprover of previous regimens, refused to believe unverifiable claims. He used his mint and hyssop for cooking and aromatics. At Monticello, his Virginia manor, he chose herb tea as a curative over the practice of bleeding, which he considered a sham and endangerment of the body. For his family's table and health, he grew rue and tansy, balm for fevers, and thyme for stomachache.

Around 1800, the importation to England and the Americas of the Chinese herb boat—also called a ship grinder, ship mill, sow & pig mill, or go-devil—applied the technology of the mano and metate to crushing herbs. A boat-shaped wood base set on bootjack legs accommodated a cast-iron wheel pierced by a pair of dowel-shaped wood handles. By leaning forward and rolling the wheel back and forth in the groove of the trough, the user could rapidly extract juice and reduce leaves, roots, and woody stems to fragments. The Chinese powered the Asian original with their feet.

The first successful New World kitchen herb business began at the Shaker commune in New Lebanon, New York. From tentative kitchen gardens, the industry grew to 50 acres (20 hectares) of physic gardening, which produced aconite, belladonna, burdock, conium, dock, horehound, hyoscyamus, lettuce, marjoram, poppy, sage, summer savory, taraxacum, and valerian. In addition to 200 local varieties, growers introduced about 40 varieties from the Southwest and Europe.

To build their stock, Shaker herbalists gathered wild catnip, dandelion, pennyroyal, peppermint, sarsaparilla, snakeroot, spearmint, wintergreen, and witch hazel from the wild outside their property. By 1861, the commune bottled, corked, and labeled extracts in glass vials. Workers shaped wintergreen lozenges, sewed moth-repelling herbs in bags, pressed leaves, and pulverized roots, totaling 7,000 pounds (3,200 kilograms) annually. The success of New Lebanon's herb business encouraged parallel endeavors at Shaker communes in Canterbury, New Hampshire; Enfield, Connecticut; Harvard, Massachusetts; New Gloucester,

Maine; Union Village, Ohio; and Watervliet, New York.

The gender-neutral Shaker industry put all hands to work at the herb trade, including children, who learned herbalism from adults. Sisters worked at picking and drying purslane and sweet marjoram, soaking juniper berries, trimming sarsaparilla roots, and culling lobelia flowers and leaves. They cut bugleweed for bitters, raked burdock and sage near the hearth, washed vials and pasted labels, and measured catnip powder into paper envelopes. In their kitchens, they concocted lotions, rosewater, and ointment. Within a span of 15 years, they dressed and prepared 37.5 tons (34 metric tons) of herbs for pharmaceutical use.

While preindustrial cultures continue to treat disease with belladonna and wormwood elixir, in the mid-1800s, industrial pharmacists such as Wallace Abbott, Friedrich Bayer, Eli Lilly, and Charles Pfizer edged out traditional herb gardening and plant infusions over 20 percent of the world. In the early twenty-first-century, however, clinical trials revisited traditional herbal cures and found that they contained a surprising number of anti-inflammatories, antioxidants, and phytochemicals, including salicin from willow bark for fever, capsaicin from chili peppers for arthritis, and echinacea from purple coneflower for boosting the immune system. Seriously ill patients sought Latino botánicas, Ayurvedic gurus, and Cherokee and Navajo shamans for advice on treating cancer, diabetes, and vascular ills. Abandoning belief in magical properties, seekers turned to alternative and complementary healers and herbalists, who based dosages on experience rather than controlled laboratory analysis.

Currently, medical journals acknowledge aloe for simple burns, blackberry and cranberry juice for treating urinary tract infection, and valerian for insomnia. Health journals boost the popularity of chamomile, cumin, lemongrass, oregano, Saint-John's-wort, saw palmetto, and turmeric for a variety of ills, from depression to dyspepsia and prostate engorgement. Along the Amazon River and into sub-Saharan Africa, India, and northern Siberia, ethnobotanists and biochemists comb the cultural wilds for food enhancers, such as black cohosh, crocus, hoodia, lavender, and medicinal fungi, that lower incidence of Alzheimer's disease, bipolarism, high blood pressure, menopausal complaints, and obesity. Herb markets dispense age-old Chinese curatives—*dong quai* (angelica), *mahuang* (ephedra), salvia, and spurge (euphorbia)—all applicable to a host of ills. In August 2011, reports on the potency of coriander seed oil against

microbes including *Escherichia coli* (*E. coli*), MRSA, salmonella, and staphylococcus raised possibilities for a harmless control of food bacteria by a natural product.

See also: Apicius; Culpeper, Nicholas; Curative Foods; Physic Gardening; Seacole, Mary Jane; Appendix: Herbal Foods and Uses.

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Heritage Foods

The term *heritage foods* implies an authentic regimen of cooking and eating for a particular population. The binding nature of place anchors heritage foods to a region and its produce, from high mountain goats and geoduck to prickly pear fruit and dried dates. Great Lakes Indians turned buffalo meat into a cottage industry of jerky and pemmican, two trail foods valued by expeditioners. Lao cooks localize *pahdek* (fish sauce) as an accompaniment to rice and bland entrées.

Traditional foods—Mexican salsas, Indian curry and dal, and Iberian paella—identify and preserve a people and provide staying power to culture. The binaries of a people and their foods create instant recognition of Barbadian flying fish, French wines, Japa nese sushi, Norwegian herring, and Russian borscht. Enhanced by farmer's markets and locavores, ancestral dishes gain new devotees

in the younger generation while nurturing pride in origin. By participating in the agrarian cycle—as by picking wild bilberries and stirring sorghum into molasses—youths learn the rhythms of their ancestors and experience the demands of feeding a family.

The reality of food migration implies a major shift in regional fare at least once a century. For example, the cuisine touted in elite eighteenth-century European cookbooks gave place to the national diets that arose from peasant staples and paralleled the fervor of modern nationhood. In place of imported haute cuisine, Poles reclaimed sausage; Jamaicans celebrated the pepper pot. In the American colonies, clam chowder and Christmas ambrosia marked high points in comfort food, the specialties that foster unity and fellowship.

European immigrants who settled the North American West evolved heritage dishes from fishing, foraging, and hunting. Coexistence resulted in mingling with first peoples, who already knew how to gather and dry blueberries and pine nuts, and to collect fiddlehead ferns for vegetables, and process birch and maple syrup for sweeteners. As farmers acclimated to new lands, butter and local honeys gained distinct taste and consistency from pasture clover and the lavender and lemon balm in herb beds.

Visual evidence of Moroccan tagine, Scots haggis, and Turkish figs certifies culinary history at the same time that it nurtures classic food legends, such as the West African source of okra in New Orleans gumbo and the lengthy list of potato dishes on Irish menus. The demand for historic food experiences bolsters heirloom seed marketing, the viability of small, specialty farms and artisanal bakeries, and higher sales of farmstead cheeses and niche jams and sausages. Fairgoers jam Heritage Food Day booths to taste genuine local treasures, the chicken pies, beef satay, and Caribbean boil-downs that date to the kitchens of regional founders.

An incentive to local cooks, heritage foods provide proof of cultural longevity, a tangible, edible evidence of such classic foodways as English ale and Kenyan bushmeat. The agritourist market injects among local diners outsiders who expect authenticity, from Minnesota wild rice and Mexican pineapples to Australian wallaby. Visitors to northern China look for venues serving Mongolian koumiss and hot pot, much as new arrivals to Tahiti anticipate menus featuring coconut-flavored mahimahi (dolphinfish).

The educated traveler knows that ancestral dishes offer better flavor, freshness, quality, and variety than the processed foods that industrial agriculture offers the standard grocery chain. Heirloom foods generally come to market unwaxed and undyed. Because of their suitability of soil and climate, they require less chemical nourishment, antibiotics, and pesticides. Another plus for heritage foods is the renewed stocking and low-volume husbandry of rare or endangered species—limbertwig apples, Buckeye chickens, Bourbon Red turkeys, and Southwestern Simmental cattle—and such custom crossbreeds as the beefalo.

See also: African Diet and Cuisine, Sub-Saharan; Dairy Food; Idiocuisine; National Dishes; Pemmican; Regional Cuisine; Seed Trade.

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[Herodotus \(ca. 484-ca. 425 B.C.E.\)](#)

The Greek “Father of History,” Herodotus of Halicarnassus introduced readers to the dietary manipulations and idiosyncrasies of the peoples he visited. He grew up on Samos and learned the Ionian dialect and Mediterranean lore. His family appears to have joined a cabal against a local tyrant and to have infused the boy with libertarianism. One of his anecdotes lauded the Samians for feeding honey cakes topped with sesame seed to 300 boys whom the Corinthians had marked for starvation.

Herodotus traveled the Crimea, Middle East, India, and Africa and compiled legends and observations for a systematic history. His accounts of civic and military strategy frequently expressed the dangers of losing control of city stockpiles or army supply trains. Among his conclusions, he stated that food choices by agriculturalists marked the height of civilization, while pagans far from centers of learning, such as the Padaeans of India, ate like savages and cannibals.

Herodotus's masterwork, *The Histories* (ca. 428 B.C.E.), described unique aspects of the known world, including the grain produced on land watered annually by the Nile overflow. He admired the health of Egyptians and noted their love of barley beer, imported Greek wines, and millet breads. By reporting on the Persians under Cyrus, Cambyses, Darius, and Xerxes, Herodotus drew conclusions about the luxuries and wrongheadedness of Athens's most virulent enemy. The withdrawal of Xerxes' army from Greece forced soldiers to eat bark, grass, and leaves, a source of epidemic dysentery. Upon arriving in Egypt at Abydos, the forces died in alarming numbers from stuffing themselves with food and from undergoing a change of water, a violation of Hippocratic dietary regimen.

The historian filled in details of food history, including the use of wood tuns to transport Armenian wine, the absence of figs in Babylonia, and the scheduling of athletic contests at Atys (present-day Turkey) to distract citizens from an 18-year famine. His survey of the builders of King Cheops's pyramid noted expenditures for bread, garlic, leeks, onions, and radishes. Far from the meat-centered diet of Greece, Herodotus observed Hindus existing on a vegetarian diet. To audience applause, he read his astounding mélange of stories at the Olympic Games. Banished from Halicarnassus for taking part in a rebellion, he died at Thurii, a Greek colony in southern Italy on the Tarentine Gulf, around age 59.

In place of predictable narrative, Herodotus permeated his storytelling with digressions on oddities, such as the Egyptian priest's love of goose meat and avoidance of fish, the use of swine to thresh grain, and the presentation of a mock cadaver and coffin at banquets to remind diners of their mortality. He seemed fascinated by the Egyptian loaves made from lotus heads and papyrus roots and by the offering to Isis of a bullock stuffed with bread and honey, figs, raisins, and frankincense and myrrh, his only detailed recipe. He covered extreme foods, such

as Harpagus's cannibal feasting on his own son, whom the Mede tyrant Astyages surreptitiously served boiled and roasted. *The Histories* marveled that one tribe on an island in the Araxes (Danube River) lived entirely on roots.

Herodotus made value judgments about human diet, such as the Thracian fondness for drunkenness, war, and pillage and the soft Persian diet that yielded soft soldiers. He admired the Babylonian diet of honey, palm fruit, sesame oil, and wine and extolled both the Babylonians and Arabs for refraining from meals until they had washed themselves. Herodotus made an example of the Spartan self-restraint of Pausanias, the general who rejected the sumptuous spread in Commander Mardonios's tent as a sinful example of Persian hubris and vanity.

Herodotus also stressed the political cost of violating local foodways. The Persians flouted the custom of watering table wine at a feast for the Massagetae (Iranians), whom the Persians defeated by deflecting them from war to gorging themselves. When Persian legates to Macedonia insisted that women join them at dinner, young males disguised themselves as girls and slew the ambassadors with daggers. Some of the tales led critics to call Herodotus the "Father of Lies"; later historians called him the "Father of Comparative Anthropology."

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[Hiatt, Jesse \(1826-1898\)](#)

The cultivator of the Red Delicious apple, fruit grafter Jesse Hiatt propagated one of the world's preferred health foods, an icon of American agriculture.

A native Quaker of Randolph County, Indiana, Hiatt learned grafting and pruning from his father, William Hiatt. Jesse farmed until his parents' deaths and then migrated to Mill, Indiana. Upon settling in East Peru, Iowa, in 1856, he, his wife, Rebecca Jane Pearson Hiatt of Ohio, and their ten children occupied a two-room log cabin and operated a flour mill. After traveling southwest by wagon with his brother Aaron to buy tree stock in Oskaloosa, Jesse Hiatt hybridized an apple orchard of Hiatt Blacks and Hiatt Sweets.

In October 1872, two rows of Hiatt's apple seedlings, Yellow Bellflowers and Winesaps, produced a mutation called a "sport" or "sucker." For two years, he cut back the shoots. In the third year, he allowed the loner to grow. A decade later, the scion yielded its first fruit, an American original he named the Hawkeye. Into the 1880s, Hiatt advertised his uniquely sweet, long-bodied apple at Iowa fairs. A heavy producer, Hawkeyes yielded 750 boxes per acre, as opposed to other strains that yielded only 200 boxes.

In 1893, Hiatt sent four Hawkeye apples to a fruit show in Louisiana, Missouri, to compete against the popular Ben Davis, a rugged commercial apple. The judge, U.S. chief pomologist Henry Elian Van Deman, awarded first prize to the Hawkeye. Clarence McCall Stark acquired rights to the apple and, in 1895, marketed it for Stark Brothers Nursery as the "Delicious." To introduce its uniqueness, Stark gave bundles of ten free saplings in orders to apple propagators. After acquiring a Yellow Delicious in 1914, Stark renamed Hiatt's hybrid the "Red Delicious."

By 1922, for appearance, flavor, postfrost flowering, and integrity in storage, the Red Delicious apple sold 8 million trees. Iowans honored Hiatt's mutation by fencing in the original tree, which survived until an ice storm toppled it in 1940. A granite monument honors the spot. By the early 1940s, the fragrant, strawberry-red apple revolutionized the American fruit industry. It introduced a profitable family farm product by generating more income than any other apple.

Orchards rewarded growers with a strong-limbed tree resistant to fire blight that adapted to most soils and required little pruning. Subsequent offshoots—the Starking, Richared, Starkrimson, Redspur, and Royal Red— earned awards for taste and texture in the United States and throughout the world. By the 1980s, 70

percent of Washington State dessert apples were Red Delicious. Although harvested between August and October, high-tech chillers and atmospheric controls made the apples available year-round.

Because further tinkering with color, shape, firmness, and juiciness reduced taste, subsequent crops of 300 variants of Delicious apples sold poorly. While health advocates lauded apples for reducing cancer of the colon and lungs and for lowering cholesterol, buyers rejected later strains for mealy pulp and thick, bitter skin made chewier by waxing. In the late 1990s, the apple industry foundered, requiring government aid.

In 2003, as the Cameo, Fuji, Gala, and Granny Smith gained favor, only 37 percent of Washington State farmers grew the Red Delicious. Desperate orchardists in New York and Wisconsin turned to heritage strains and organic fruit. As of spring 2011, only 10 percent of Washington State acreage grew the Red Delicious.

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[Holiday Dishes and Festival Foods](#)

Celebratory meals and holiday dishes commemorate life and reclaim national pride or group identity. A barbecue may honor a regional celebration such as Juneteenth or Australia Day every January 26. The spicing of red snapper commemorates Southern heritage on Martin Luther King Day every January 15 since 1983. Shared cake and punch at weddings, births, bar mitzvahs, graduations,

and funerals foster personal regard for beliefs and ethnic identity, as with fiesta dishes for July 24, Simón Bolívar Day in Bolivia, Colombia, Ecuador, Panama, and Venezuela. In one instance, Heiva I Tahiti, spit-roasting a pig acknowledges the end of French colonialism in the Windward Islands on June 14, 1985.

Banquets and food fairs enhance community values, such as cupcakes in the colors of the French flag for Bastille Day, piki corn for a Hopi kachina initiation dance, hot *syllabub* for a Welsh winter solstice festival, a crab boil-up at the end of a Newfoundland fishing expedition, and Eastern Orthodox Easter eggs in Armenia. Commemorative banquets acknowledge survivors of epidemics, invasions, and wars, notably chocolate coins and jam-filled Hanukkah doughnuts that have honored Hasmonaean strongman Judas Maccabees since 160 B.C.E. and D-Day banquets that have reunited Allied soldiers and members of the French Resistance every June 6 since 1945.

The selection and preparation of food and drink for holiday occasions join celebrants worldwide in the enjoyment of festal foods. Specific ingredients connect to seasons of the year, especially meats served fresh during fall slaughtering and fruits and vegetables connected with garden harvests, such as Kwanzaa. Wild clover honey, plover eggs, walnuts, and strawberries stress the control of natural cycles over human sustenance. Sources link specific dates to religion, culture, and food lore. The following list includes some of the most notable.

January 1: The Greek *vasilopitta* (New Year's cake), flavored with lemon rind and anise seed, bears the new year inscribed in the crust. The baker inserts a good luck coin in a slit; the finder enjoys 12 months of prosperity.

In Ireland, traditionally, a wife serves the year's first raisin bread to her husband. He takes one bite each for Father, Son, and Holy Spirit, then hurls the leftover piece to defy famine. The ritual ends with a prayer that no family member may suffer hunger. The wife gathers the pieces to serve guests.

In the American South, cabbage and rice for New Year's Day ensures riches. For health, families eat field peas with hog jowl and collard greens. A lavish outlay for the family reunion fills trestle tables with corn pudding, squash casserole, and sweet potato pie, traditional New World fare that Native Americans cooked for millennia.

From the 1700s, French confectioners molded vanilla, cinnamon, orange, lemon, and rose bonbons and sold them in *bonbonnières* (holiday boxes). French woodsmen taught the Sioux of St. Paul, Minnesota, recipes for New Year's cakes.

January 6: On Epiphany at the Feast of Kings commemorating the arrival of the Magi to the Christ Child, the French pastry chef decorates a *galette du roi* (king's cake), a regal dessert derived from the Roman Saturnalia and containing a token identifying the year's Twelfth Night king, who reigns for a day.

In colonial Cahokia, Illinois, Frenchmen enticed their sweethearts to make pancakes on Epiphany night. To supply the kitchen, the men processed in costume on New Year's Eve to panhandle sugar, maple syrup, and ratafia, an almond-flavored fruit liqueur.

January 7: In Kyoto, Japan, the eating of seven-grass rice gruel began under the Emperor Daigo in 897. Cooks soft-boil rice blended with wild celery, shepherd's purse, turnip, and daikon radish.

January 25: In Scotland, the preparation of haggis on Burns' Night commemorates plowman poet Robert Burns, born in Ayrshire in 1759. To accompany whiskey, cooks grind heart, liver, lung, oatmeal, onion, spices, and suet for tying into sheep stomachs. They boil the bundle for three hours to serve with clapshot, a purée of "tatties and neeps" (potatoes and swedes).

February 1: The Irish and Welsh celebrate St. Brigid of Kildare, an enslaved native of fifth-century Croghan and the patron of dairiers. For the hungry, she miraculously produced milk and butter. A feast honors her with spreads of dairy foods, raisin bread, and colcannon, a mix of onions, cabbage, and potatoes.



A family in northeast China gathers at the table to welcome the new year. A celebratory meal and traditional festive dishes commemorate religious, civic, and folk holidays among people everywhere.

(Reza/Getty Images)

February 2: In midwinter, Candlemas delights people worldwide as Pancake Day. Cooks make fritters, pancakes, doughnuts, and biscuits to commemorate the purification of the Virgin Mary, who presented the infant Jesus at the temple of Jerusalem according to Jewish law.

February 14: On St. Valentine's Day in the 1600s, Englishwomen gathered at 11 p.m. to bake a "dumb cake" from salt and wheat and barley flour. Taking turns rolling the dough, they pricked their initials on the surface and baked the cake in silence. At midnight, they awaited their true love.

March 1: To welcome spring, the Romansh of Engadine, in western Switzerland, observe Chalandamarz, a children's festival derived from the old Roman New Year on the first day of March. They prepare such folk delicacies as cream-drenched chestnuts, caramels, fruit and nut breads, and tarts.

March 17: Throughout the Catholic world, the Irish reverence Patrick, Ireland's patron saint, who died on March 17, 493 C.E. Bakers shape cakes in the form of shamrocks and tint both confections and beer green, a symbol of promise.

March 19: Italians indulge in fritters, cream puffs, and *bigne*, a fried doughnut, at the Feast of St. Joseph. In Sicily, bakers fill dough with chocolate, pistachios, and sugar as votive offerings to the saint, who protects them from famine.

March 20: On Persian New Year's Eve, Ira ni an cooks shape egg noodles, a stringy peasant dish first mentioned in Arab cookbooks in the 1200s. The threads, added to bean soup, symbolize the reins of life as well as the unraveling of knotty problems and life's tangled paths. The noodles also bless the bonds that unite a family.

April 1: On April Fool's Day, French confectioners shape chocolates into the *poisson d'avril* (April fish) in recognition of Pisces and the vernal equinox.

May 1: From early Celtic times, Scots made bannock cake to celebrate Beltane, a Wiccan holiday. Each loaf had nine knobs. Ritual required participants to tear off and toss the knobs over their shoulders and dedicate the bread to the god of livestock. Herdsmen lit the Beltane fire and whipped eggs into milk, cream or butter, and oatmeal to dress the bannocks.

Shrove Tuesday Eve: On Collop Monday in England, Christians cut bacon collops, or pieces, to salt and hang during Lent. Before the meatless period begins, Cornish observers make pea soup; the Irish gorge on meat, pancakes, eggs, and dairy goods.

Shrove Tuesday: The day before Lent, Fastens-Een begins with a Scots carnival, a bonanza of fried foods, pancakes, roast meats, and serpentine cakes. The tradition dates to the Roman Saturnalia, when cooks embellished baked swans, peacocks, herons, or pheasants as food spectacles.

Lent: Among Christians, abstinence preceding Easter calls for fish, lentil, cheese, and bean dishes as alternatives to meat. A more stringent apostolic meal also rejects eggs and dairy items during Lent.

Mothering Sunday: On the fourth Sunday in Lent, English cooks around Bristol make mothering buns, an iced yeast bun topped with decorative candies and served at breakfast.

Palm Sunday: On the Sunday preceding Easter, French bakers honor the arrival of Jesus on a donkey at Jerusalem by making animal cookies.

Good Friday: Bakers at Old Chelsea Bun House in Jews' Row, London, advertise hot cross buns for breakfast. The custom echoes Babylonian offerings to the goddess Astarte and combines the traditions of Jewish Passover cakes and the Eucharist.

Holy Saturday: A Russian Orthodox ritual meal of savory and sweet treats remains spread until Easter Monday. To symbolize the Trinity (Father, Son, and Holy Ghost), food preparers fill Easter baskets with ham, sausage, and roast veal. A sweet cheese molded in a tall pyramid becomes a crown when decked with raisins and cherries to suggest majesty and resurrection.

Easter: Globally, the egg symbolizes rebirth and regeneration. On Easter eve, German house wives wrap eggs in patterned cloth and hide them for children who await the Easter hare. Cooks throughout Christendom shape treats like rabbits and hens.

Russians carve a block of butter into a reclining lamb and add tinfoil horns. Celebrants exchange eggs and exult "Christ is risen," a phrase abbreviated on baking molds. On the same date, Zoroastrians boil eggs as New Year's gifts.

June 11: In 1871, Hawaii's King Kamehameha V decreed June 11 as a holiday recognizing his grandfather, Kamehameha I, the patriarch and unifier of the Hawaiian islands in 1810. Hawaiians celebrate with parades and a luau, a native feast.

June 24: In Prado and Madrid, Spain, cooks fry fritters in the public square on St. John the Baptist Day or Midsummer Day. Latvian house wives make cheese and light solstice bonfires.

Early August: In Gallup, New Mexico, a Pueblo festival involves fry bread and piki cakes to accompany corn and hoop dances, drumming, and chant.

August 24: Swedish briners age herring in barrels until August 24, St. Bartholomew's Day, when cooks serve it with sour milk or cream, cheese, bread,

and onions.

September 29: In July 1588, after the defeat of the Spanish Armada, Queen Elizabeth I proclaimed roast goose an annual Michaelmas dish.

Harvest: Among the Seneca of New York, a traditional harvest feast called for cauldrons of succotash, dog meat, and cabbage. The day concluded with a corn dance in thanks for a successful garden.

October 21: In Majorca, observers of St. Ursula Day and the Feast of the Virgins make sugared pastries or fritters to serve with wine to the young men who serenade girls with guitar solos.

October 31: British families roast nuts on the night preceding All Saint's Day. The nuts that glow steadily predict constant love; those that burst into flame foreshadow a brief romance.

November 1: On All Saints' Day, Czechs consume soul cakes with cold milk to cool souls in Purgatory.

November 11: In Anglo-Saxon times, Martinmas welcomed winter. After animal slaughter, "pig cheer" provisioned the pantry and smokehouse.

Thanksgiving: The American Thanksgiving commemorates the first Christian harvest festival. After the Battle of Gettysburg on July 3–4, 1863, President Abraham Lincoln declared August 6 a day of national gratitude. Subsequent presidents emulated his example on the last Thursday of November, a national holiday associated with expanded tables—featuring turkey—to treat family and guests.

December 4: At the Tsubaki Grand Shrine in Mie, Japan, and its sister religious site at the Tsubaki American Shrine in Stockton, California, part of a ritual calendar of events schedules a Shinto ceremony, *Mochi-tsuki*, the ritual making of *mochi* (rice cakes).

December 13: Swedish children deliver a festal breakfast to adults on St. Lucia

Day, which honors the Roman virgin's martyrdom in 304 C.E. The oldest girl prepares a tray of coffee and sweet St. Lucia buns pocked with raisins for a pre-Christmas breakfast.

December 17: Ancient Rome feasted and celebrated the height of December. To honor Saturn and mark the beginning of the agricultural calendar, citizens and slaves acknowledged Saturnalia with banquets and cries of "Io, Saturnalia!" Disapproving of the pagan source but applauding the egalitarian motives, Christians converted the citywide indulgence into Christmas, a pious celebration of the birth of Christ.

December 24: For Yule feasts, Europeans seek the best foodstuffs. In Italy, a flat circle of sweetened focaccia serves throughout the season. Russians place a samovar for tea along with varieties of fish and cakes and a blessed wafer to be divided among guests.

As described in Laura Ingalls Wilder's *Little House on the Prairie* series, frontier Kansans anticipated holiday baking. Ma Ingalls kneaded salt-rising and rye 'n' Injun breads and made Swedish crackers and beans seasoned with molasses and salt pork.

December 25: The Dutch celebrate Christmas with gingerbread. For the annual wassail bowl, which accompanies a feast, punch preparers dissolve spices in boiling water and add wine, sugar, and a frothy egg yolk topping. Bakers distribute wheat biscuits spiced with cinnamon as a sandwich cookie with almond paste in the center.

Medieval English cooks prepared a boar's head with crisp, brown skin. They garnished the beast with mustard, wreathed it in bay leaf and rosemary, and secured a lemon in its mouth as a Norman symbol of abundance. Wait staff processed around the table with the centerpiece lifted on a platter.

In Toledo, Spain, where Arab confectioners introduced marzipan in 700 C.E., the *mozarabes* (Christians under Muslim rule) shaped almond paste into holiday figures and glazed them with colored sugar-water. Convent kitchens began their own candy-making fund-raisers with ancient recipes and food dyeing techniques.

Victorian Christmas celebrations called for prunes and raisins for punch, puddings, porridge, and plum cake. In Charles Dickens's *A Christmas Carol*

(1843), the emblematic Cratchits, surviving in penury on “fifteen ‘bob’ a week,” manage a festive roast goose, applesauce, potatoes, sage and onion dressing, and gravy, with a dessert of flaming, brandy-soaked pudding. The story so fixed itself in the English-speaking world that re-creations in art, drama, song, and film elevated the Cratchits’ holiday into a folk sacrament.

December 26: First celebrated in 1966, the U.S. observance of Kwanzaa from December 26 to January 1 commemorates the seven principles of blackness with candles and a first fruits table. Guests share a loving cup and feast on fresh fruits and vegetables prepared in West African style.

December 31: After the Catholic Church banned Christmas celebrations in 1649, Scots compensated with a huge New Year’s Eve event, which they named Hogmanay for the Anglo-Saxon “Holy Month.” The traditional bash featured oatcakes, cheese, black buns, and a Highland stir-up of oatmeal, honey, cream, and Scotch whiskey.

Among Orthodox Christians in Greece, the celebration of St. Basil’s Day (January 1) begins the night before with the baking of brioche into a yeasty loaf-upon-loaf crowned in almonds and walnuts. After the head of house cuts the cake, diners look for a foil-wrapped good-luck coin inside.

Memorable ingredients—mincemeat pies and plum pudding with sherry for Christmas in England, wheat pudding on March 20–21 for Persian Norouz on the vernal equinox, corn dishes on May 1 for the Zuñi Green Corn Dance, and rice pudding for the Hindu Diwali (festival of lights)—respect traditions dating into the past. Examples incorporate special items—strawberries in cream for Swedish Midsummer, fried carp for Czech Christmas Eve dinner, matzoh cake for Jewish Passover, *mikigaq* (fermented whale meat) for the Inuit dead whale requiem on December 10, roasted chestnuts and stollen (sweet loaves) in Germany and panettone (fruitcake) in Italy for Christmas, and abalone soup for Vietnamese New Year. The consumption of four-leaf-clover cookies and green beer on March 17, St. Patrick’s Day, brings out the Irish in people worldwide.

In prehistory, Koreans celebrated the winter solstice each December 21 with red bean porridge and rice balls. Since the rise of Judaism, Sukkot, a harvest festival, has called for stuffed eggplant or zucchini as a symbol of satiety. From the fifth century C.E., Old Norse Seto-speakers of Estonia honored the warrior

class with picnics at barrow graves. After the seventh century, Muslims in Somalia celebrated Eid al-Fitr, the end of the Ramadan fast, with beef turnovers. On Malta, since the eleventh century, New Year's celebrants have eaten grapes to ensure wellness throughout the year; the Chinese observe the same occasion by boiling long noodles and steaming fish whole to promote longevity.

The Christianization of nations replaced pagan cuisine with ritual dishes, such as the sweet rolls and chocolate consumed on the Mexican Día de los Muertos (Day of the Dead), a replacement for the Aztec Miccailhuitontli, which honored deceased children. Russians introduced cakes with domed tops in imitation of Orthodox cathedrals. The African diaspora inspired Kwanzaa, a midwinter festival of harvest foods that restores ties to primal West African roots. In Mexico, as early as 1798, Catholic cooks prepared waterbug eggs as a garnish for shrimp *revoltijo* to serve on Christmas Eve and Maundy Thursday.

What ever the holiday, food represents the nourishment of human hopes and faiths. Since September 18, 1810, Chilean cooks have celebrated independence from Spain with empanadas, turnovers filled with meat or fruit and raisins. In 1950, worshippers in Sri Lanka formalized Vesak, the observance of Buddha's birth in May or June. Cooks kept the occasion with green mango curry. Malaysians fried rice vermicelli, which they flavored with bean sprouts and mustard.

See also: Chocolate; Customs, Food; Dal; Moravian Diet and Cuisine; Religion and Food; Silk Road.

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Honey

An organic sugar and natural curative, honey holds a unique place in culinary history for its viscous consistency and sweet flavor. Spanish cave paintings in Bitor attest to the collection of wild honey in 13,000 B.C.E. Egyptian undertakers preserved corpses in beeswax and honey as early as 3300 B.C.E. Mourners supplied the dead with honey to nourish the spirit in the afterlife and ensure immortality. The first organized beekeeping began in clay pipes in 2400 B.C.E. throughout Lower Egypt, where papyri recorded 900 remedies concocted from honey.

In 2100 B.C.E., Mesopotamians paid a dear price— one silver shekel for 2 liters (about 2.1 quarts) of honey— and offered honeycombs as emoluments to officials and gifts to the gods. Cooks in classical Greece and Italy relied on honey as the standard sweetener and imported the best variety, thyme honey, from Attica, the Greek Isles, and Sicily. One simple dish began with the curdling of milk with fermented honey, a forerunner of honeyed yogurt. Another steeped stuffed fig leaves in honey. Sauces balanced honey with vinegar for topping fish, poultry, roast game, and salad greens. Epaenetes, a late-Hellenist food writer, described a honey stuffing made with cheese, onions, organ meats, and vinegar. Because kitchen demand exceeded supply, farmers profited from beekeeping.

Roman cookery echoed the honey-centered dishes of Greece. One specialty dish, *libum* (cheesecake), ended with the soaking of warm buns in fresh honey. Around 45 C.E., Apicius's recipes relied on honey for flavoring fish, meat, and vegetable cookery and for making mead and desserts. Homemakers cooked gruel in honey, preserved fruit and meat in honeyed liquids, and served diners *mulsum*, a fresh blend of wine with honey, or *conditum*, an aged mulsum spiced with laurel, pepper, and saffron.

Middle Ages and Early Modern Era

At the collapse of the Roman Empire in 476 C.E., Christian convents and

monasteries took over the beekeeping once pursued by farmers. Monks and abbesses preserved bee colonies to supply churches with wax for pure-scented candles and with honey and propolis (honey resin) for refectories and hospices. Scandinavian prelates fermented wine from honey and spiced their drinks into hippocras, hydromel, and metheglin, a honeyed apple cider flavored with cinnamon.



Archaeologists in northern Israel have unearthed remnants of a 3,000-year-old beekeeping industry, including the oldest intact beehives ever found. Documentary evidence of organized apiculture dates to about 2400 B.C.E. (*Amihai Mazar/Hebrew University of Jerusalem/Associated Press*)

Simultaneous with Christian food history, evidence from the Mayan, Hebrew, Buddhist, Islamic, Norse, Celtic, and Hindu cultures depicted honey as a skin treatment, health food, aphrodisiac, fertility enhancer, and gift of the gods. Practitioners of Ayurvedic medicine ranked honey high among foods that balanced organ activity. In the *Compendium of Materia Medica* (1578), Li Shih Chen, a Chinese apothecary, prescribed honeyed food and drinks as analgesics. Later Chinese medical texts extolled honey for “benefiting vital energy” and boosting the healing power of hundreds of herbs. Nutritionists recognized that honey, like alcohol, was a rare food that energized the body by going directly into the bloodstream; Japanese gastronomes prized honey and bee larvae, sold together in open-air markets. In North America, Canadian first peoples served

wild strawberry puree in honey, a treatment for sore throat and inflamed tonsils. Plains Indians recommended cooking beans with honey, the forerunner of American baked beans.

Industry

Art elevated the bee as a metaphor for organized urban centers and honey as a symbol of civilized industry. British colonial activity, beginning in Virginia in 1622, spread the European bee (*Apis mellifera*) and beekeeping techniques to the Americas, Australia, New Zealand, and Tasmania. The seventeenth-century cook turned spiced rye cake into honeyed *pain d'épice* (gingerbread), a delicacy and energy food favored in multiple cuisines, from France, Germany, Norway, Poland, and Switzerland to the Middle East. Across Europe, hosts warmed guests by the fireside with mulled wine, a honeyed and spiced wine heated with a fire poker plunged into each tankard.

By the 1800s, the honeybee spread west in North America, distributed in part by Mormons settling Utah and by apiarist L.I. Langworth, who practiced scientific apiculture in Los Angeles. Hive managers set up colonies with hive frames, smokers, and honey extractors, the tools of commercial apiculture. Villagers from the Catskills to the Sierra Madres promoted local honey for its unique flavor and crystallized candies for their nutritive value.

Throughout the abolitionist era, U.S. boycotts of slave-produced foods ruled out molasses. In 1839, to promote free-labor honey as a substitute, reformer and poet Elizabeth Margaret Chandler of Tecumseh, Michigan, published a honey tea cake recipe in the antislavery newspaper *Genius of Universal Emancipation*. During the Civil War, women's groups issued the recipe in fund-raising cookbooks to aid the Sanitary Commission in opening and equipping rehabilitation centers for the wounded.

The availability of cane sugar in the mid-1800s generated the first substantial competition with honey for condiments and confections. During World War I, German medical teams monopolized supplies of honey for sanitizing wounds. Sugar rationing during World War II increased demand for natural sweeteners, including honey, birch sugar, and maple syrup. A postwar glut of sugar in the

1950s reduced the price of honey and forced many professional beekeepers out of business. The industry continued to thrive among smallholders, however, as illustrated by the success of organic honeys from the Hawaiian Islands.

Currently, beekeepers market products based on terroir, the complex influence of geography, climate, and temperature. Aficionados reject blended stock and seek monofloral sources made from the nectar of acacia, clover, heather, honeysuckle, lime, orange blossoms, or sourwood. Choice honeys offer rich aftertaste—fruity savor from blackberry or blueberry honey, floral tones from white sage honey, malt from buckwheat honey, and citrus from saw palmetto honey. Artisans pair monofloral honeys with other foods, such as nutty chestnut honey with Gorgonzola or Parmesan cheese. To prevent allergies, buyers prefer raw, in-the-comb, unfiltered, and unpasteurized honey containing pollen that lessens eye, nose, and lung sensitivities.

Since late 2006, colony collapse, a biotic catastrophe to hives from pathogens, monocultural farming, or pesticides, concerns European and North American farmers. In 2011, honey packagers who rely on the honeybee for pollination and hive and honey generation feared for the survival of the planet's colonies and for future pollination of fruits, tree nuts, and vegetables.

See also: Adulterated Food; Apicius; London Virginia Company; Sicilian Diet and Cuisine; Sugar and Sweeteners; Theophrastus.

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Hormones in Food

The steroid hormones that control development, growth, and reproduction in animals cause consumer concern when they infiltrate human meals. With the artificial enhancers—estradiol, melengestrol acetate, progesterone, testosterone, trenbolone acetate, zeranol—synthesized in the 1950s, livestock inject some 80 percent of young animals with unnatural hormones or add steroids to their feed. The additives cause injection lesions but make animal young achieve adult size 20 percent faster at a growth rate of up to 3 pounds (1.4 kilograms) per week. Speedy maturation limits the amount of stall-feeding necessary before slaughter. The injections increase profitability by boosting feed efficiency with less food and by reducing fat marbling in meat.

Similarly, dairy cows and goats treated with bovine pituitary extract give 15 percent more milk over an extended lactation period, thus reducing the need for large herds and their impact on the environment. The treatment stresses the cow, which incurs an increase of milking time from eight to 12 weeks. In addition, hormones increase risk of calf deformity, increased twinning, and smaller offspring as well as internal bleeding, mastitis, ovarian cysts, retained placenta, and hoof disease and sores causing lameness. Because the ailments require treatment, antibiotics increase additives in milk and dairy products.

Consumers question the unmonitored drugs in dairy foods and meat. Synthetic steroids such as diethylstilbestrol (DES) increase cancer risk from uncontrolled cell division in the breast, colon, prostate, and testes. Since 1950, incidence of breast cancer has risen 55 percent. More alarming are the 120 percent increase in testicular cancer and 190 percent rise in prostate cancer. DES also causes child breast enlargement, early onset of puberty, and vaginal cancer in daughters of mothers treated with DES during pregnancy.

In the late 1970s, U.S. Food and Drug Administration inspectors banned time-release DES pellets from ear implants in cattle and sheep, but not from use in poultry and swine. The European Union (EU) concluded that growth hormones have carcinogenic, developmental, genotoxic, and neurobiological effects on human consumers. The EU issued a ban on synthetic hormones in 1989, and a decade later, Canada halted the treatment of beef cattle with growth enhancers. Additional rejections of hormones in beef occurred in Australia, Japan, and New

Zealand.

Since 1993, the addition of Monsanto's genetically modified bovine growth hormones (BGH) to dairy cattle has spread to 30 percent of U.S. cattle. The intervention in natural cycles raises milk production by some 25 percent but causes alarm in farmers, consumers, and scientists. More objectionable to the public, the injection of 90 percent of calves raised for veal with the hormones meant for adult cattle leaves uncalculated the amount of growth drugs that remain in the meat.

Until veterinary authorities evolve exact testing measures for food additives, the medical community fears for the safety of children, pregnant women, and the unborn. A 2007 study raised the issue of low sperm count in men whose mothers ate meat treated with potent sex hormones. Generating alarm for the environment, pollution of watersheds by hormone-bearing cow feces has resulted in freakish gender and reproductive changes in wild fish, causing lower fish sperm count. Consumers avoid ingestion of synthetic steroids by purchasing only hormone-free and organic beef and milk, but their choices boost the price of food without guaranteeing better quality. Spurring caution were reports from Shanghai, China, in 2005 that 330 consumers died from eating pork tainted with clenbuterol, a weight-loss steroid that had been banned since the 1990s.

Further muddling the issues of synthetic food additives, the media charges that organic farmers generate propaganda to spread myths about growth hormones and their effects on human health. Animal rights advocates respond that organic animal husbandry produces healthier animals needing neither antibiotics nor hormones and meat containing more omega-3 fatty acids. In answer to the consumer's quandary, some medical authorities advocate cutting back on meat and dairy to limit the amount of synthetic animal nutrients in the body.

A model of biotechnology in pisciculture, raisers of AquaAdvantage Salmon at AquaBounty Technologies, a land-based facility in Waltham, Massachusetts, apply growth boosters to produce fish twice as large as wild Atlantic salmon. The control of biological processes through gene and protein analysis results in sterile all-female fish requiring 10 percent less feed and enhances disease resistance while shortening the growth period by more than 200 days. The end product outweighs wild salmon by 4.4 pounds (almost 2 kilograms).

Medical authorities fear that low concentrations of hormones over time may

damage the human consumer and contaminate groundwater; however, tests, both industry funded and independent, are inconclusive. In July 2011, company officials declared transgenic fish biologically and chemically indistinguishable from native species and promoted more fish farming to prevent the possible extinction of major food species by 2050.

See also: Animal Husbandry; Beef; Exotic Food Clubs; Organic Foods; Pork; World Trade.

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Horses

A controversial topic in world food analysis, horse meat, or *viande chevaline*, suits the tastes of diners in Asia, Europe, and South America but repulses potential consumers in Australia, Canada, Ireland, and the United States. Taboos derive from beliefs that indiscriminate horse slaughter wastes a dignified sport and work animal. Jews and Hindus condemn the consumption of horse meat; Muslims prohibit the eating of donkeys and respect a social taboo against horse consumption.

Much sentimentality caused by equine consumption arises from gratitude. The ass, burro, donkey, horse, mule, and pony enabled nomads to achieve a settled

life. In Kazakhstan and the Ukraine about 4500 B.C.E., herders gentled the horse, a major contribution to streamlined labor and a source of gelatin, glue, hair, leather, meat, and milk.

Around 550 C.E., farmers modernized soil preparation with the invention of the horse shoe and halters for draft horses and the moldboard plow for inverting weedy clods and exposing the roots to the sun. A heavier metal-faced plow crafted around 600 C.E. improved yield and fostered a population spurt. The arrival of the dog and horse in the Western Hemisphere after 1492 presented methods of pulling plows and travois and introduced native Americans to a new source of jerky.

As a food, horse meat offers a low-calorie source of iron and protein. Hippocrates, a Greek physician in the fifth century B.C.E., considered the flesh tender, digestible, and more palatable than beef. Horse meat contains less fat than deer or rabbit and more protein than kid, lamb, pork, or venison. However, slaughtering horses raises ethical and religious questions about their designation as dietary staples.

Horse Meat in History

Historically, the Arabs, Koreans, Russians, and Sumatrans were long-term horse meat fanciers. The Chinese preferred the flesh of white horses. Their physicians prescribed horse meat to reduce fever and the horse brain and mare's milk for treating scurvy, but they discarded the liver as toxic. Huns and Tartars treated horse sores by placing salted jerky under their saddles. Mongols treasured koumiss, fermented mare's milk, as a daily refreshment high in vitamin C. Persians celebrated birthdays by roasting whole asses and horses. Sarmatians and Thessalians made cheese from mare's milk and ate horse meat raw.

The pagan Teutons regarded horse consumption as an honor to the god Odin. In response to Germanic idolatry, Pope Gregory III in 732 C.E. issued a ban to St. Boniface, a missionary to Germany, on hippophagy, or the eating of horses, which the church valued as companions and as mounts for cavalry under assault by an Islamic army. After 741, Pope Zachary upheld the interdict and equated horse eating with the consumption of beavers, crows, rabbits, storks, and other

unclean animals.

At the Second Council of Nicaea in 787, Bishop Gregory of Ostia denounced hippophagy. In 1000, when Icelanders accepted Christianity, at the direction of Catholic priests, the islanders forfeited horse dishes from their tables and stopped exposing unwanted babies in the wild. The pairing of the two practices captured the revulsion Christians felt for wanton slaughter.



While socially taboo or legally prohibited in the United States and elsewhere, the consumption of horse meat persists in parts of Asia, Latin America, and Europe. This butcher shop in Paris specializes in *chevaline*.

(Christophe Simon/AFP/Getty Images)

From the late Middle Ages to the nineteenth century, horse meat traditionally relieved famine, such as the loss of Christian army rations during the Crusades in July 1149 after Turks burned provisions and the starvation accompanying the British naval siege of Copenhagen from August 16 to September 5, 1807. To save money, Danes served prisoners boiled, roasted, and salted chevaline as well as

horse sausage. Spaniards ate the horses killed during bullfights. Ottoman Turks rated horse meat on par with the meat of antelopes and camels. Italians made a delicacy of sun-dried horse jerky; Belgians at Ghent manufactured horse bologna. The English supported an under-the-counter business in horse meat, which fed the underclass.

The French developed a fondness for chevaline. Rather than waste the flesh of the dead animals, they marketed horse meat. After French soldiers developed a taste for equine flesh during Napoleon's retreat from Moscow in late 1812, French ministers questioned the origin of anti-hippophagy. A French culinary commission established in 1825 examined the difference between beef and chevaline and determined that horse meat cost little. Army surgeons asserted that horse meat strengthened the body during convalescence from wounds.

Conflicting Opinions

On two sides of the English Channel, consumers differed in their response to hippophagy. In the 1860s, a Paris restaurant advertised steaks and *consommé de cheval* (horse broth). In 1864, the Société d'Acclimatation distributed chevaline free to the poor. As an enticement to French gastronomy, an English society promoting hippophagy held a banquet for 150 on February 6, 1868, at the Langham Hotel in London. The menu featured boiled withers, "Sole in Rocinante Oil," "Roast Pegasus," stuffed horse, jellied hooves, and "Sorbetes against Prejudice." During the Prussian siege of Paris from September 19, 1870, to January 28, 1871, horse slaughter took the place of beef butchery. A fad for chevaline, donkey, and mule dishes increased French equine consumption. In 1875, French promoters of chevaline judged the time to be right for opening a specialty butcher shop in London. The meat market failed in four months.

The slaughter of war horses during World War I provided meat for troops, who dismembered fallen army mounts and cooked the joints in the field. A similar recycling of horse carcasses during World War II fed hungry German soldiers stationed on the Russian front and the poor in cities, where rationing forbade meat distribution on meatless Mondays and Tuesdays. In postwar Japan, starving citizens survived on deliveries of American horse meat. In 1949, film

director Georges Franju protested horse slaughter in the French documentary *Blood of the Beasts*. Nonetheless, French meat dealers continued to profit from chevaline, especially the white meat of colts, which doctors recommended for the treatment of cardiac illness.

Despite claims that horse meat augments the world's food resources, more than 500 agencies protest horse slaughter in the United States as a form of cannibalism. In 2008, the Department of Agriculture compiled photos of maimed and tortured animals, many of them retired racehorses. After their transport to Texas, the Beltex and Dallas Crown abattoirs rendered 1,000 animals per week. Improper handling and the absence of feed and water stressed animals as they moved from auction to feedlot to slaughter. As meat in foreign lands, the haunches require testing for antibiotics, pesticides, and sulfonamides. One advantage to imported horse meat, it remained unaffected by bovine spongiform encephalopathy (mad cow disease).

Presently, horse meat supplies protein at the rate of 2 pounds (900 grams) a year per person in Italy, where restaurant cooks value donkey and horse flesh for its sweetness and low fat content. Additional horse butchery in Argentina, Austria, Germany, Holland, Iceland, Kazakhstan, Malta, Mongolia, Polynesia, Quebec, Romania, Serbia, Slovenia, Spain, Sweden, and Switzerland contributes roasts and salted and smoked sandwich meat. The cuts are often menu features on Lufthansa airlines.

Horse slaughter in the United States earmarks the grass-fed Western burro and mustang, wild residents of the frontier since the early 1500s. Dealers earn \$700– \$900 per animal for meat that contains no artificial foods, chemicals, or drugs. Slaughter results in the export of 90 percent of the meat to feed feral cats in zoos and for human consumption, primarily in Belgium, Canada, France, Japan, and Mexico.

See also: Agriculture; Animal Husbandry; Eliot, Jared; Sanitation; Trade Routes; Vegetarianism.

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Hot Pots

An economical source of cold weather comfort food, the northern Chinese or Mongolian hot pot heats broth for poaching or simmering individual choices of meat, seafood, and vegetables. A cozy, clannish form of on-site preparation, the heating of sliced foods and dried chrysanthemums and the dipping of scalded bits in sauce illustrate the communalism in Asian lifestyles. Variants include charcoal-fired brass, ceramic, porcelain, or steel tureens and the Korean stone pot carved from solid rock. Current heating styles replace charcoal with flaming alcohol, gas, and electric hotplates.

The use of a central cooker dates to the Zhou era around 2000 B.C.E., when ritual cookery in a three-legged cauldron drew participants around an open fire. The first identifiable variety, the mutton *huo guo* (hot pot) of northern nomads, influenced cookery in the early tenth century. A colorful legend describes how Mongol warriors boiled lamb and mutton dumplings in their helmets rather than load their horses with heavy cauldrons. Japanese adapters named the cooking method “Genghis Khan cuisine” for its Mongol origins.

Communal firepot cuisine spread quickly through China. Around 220 C.E., five-section copper or iron hot pots extended the variety of liquids in one meal. In the Yuan dynasty after 1280, the Mongol invaders replaced Chinese cuisine with their own. In the Yangtze River basin in the fourteenth century, Chongqing fishermen popularized regional flavors in hot pots, which drew diners to small restaurants and street stalls. By 1650, imperial chefs served meals firepot style to Qing rulers and to the shoguns of Edo, the capital of Japan. When mainland Chinese

migrated to Taiwan in 1949, they brought Cantonese *shacha* hot pot cookery as a form of family togetherness, an ancestral trait.

The endless combinations encourage the consumption of seasonal ingredients, especially fresh lettuce. In southern China, seafood lovers favor carp heads, crab, clam, jellyfish, mussels, sea cucumber, and squid. Simple nonmeat choices—bean noodles, dumplings, kelp, quail eggs, seaweed rolls, tofu, water chestnuts, and wontons—encourage the participation of vegetarians. Produce ranges from leafy bok choy and napa cabbage and green and mung beans to delicate enoki mushrooms, ginger and shallot slices, coriander and lime leaves, and bland potatoes and taro. The final dousing in sauce invites individuality in the choices of chili, chopped coriander or garlic, hoisin or soy sauce, and sesame oil and vinegar.

Currently, Chinese steamboats feature sections for the heating of chicken stock, milk broth, red chili, and herbed or salted water. To secure morsels, diners use chopsticks or a strainer. Szechuan style hot pot applies hot pepper oil to broth for spicing eels, goose intestines, and beef and pork blood, brain, intestines, marrow, and tripe. Mandarin aristocrats prefer thin slices of frozen mutton for cooking in mushroom and shrimp soup and eating with bean curd, pancakes, and sesame butter. The Manchurian hot pot contains sauerkraut to produce an acidic pucker. Hong Kong cooks shape fish balls and meatballs around a surprise center, such as mango. Hiroshima cuisine merges the Japanese love of oysters with miso for a balanced taste devoid of fishiness.

See also: Beef; Cantonese Diet and Cuisine; Szechuan Diet and Cuisine.

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House of India

A Portuguese joint-stock company, the Casa da India (House of India) managed a bonanza in the world food trade. From 1481 to the early 1500s, the small European country dominated commerce in spices and pepper, the world's most common flavoring. Because pepper became more valuable than gold, it served as currency. Organized in 1443 as the Company of Guinea, originally called Casa da Guiné (House of Guinea), the House of India employed merchant sailors who ventured south down the western coast of Africa, ostensibly spreading Catholicism.

Established on Portugal's southern tip at Lagos by Prince Henry the Navigator, the company focused on transporting sugarcane from the Madeira Islands by caravel. By bartering with English liqueur, marketers succeeded in crushing the monopoly in "sweet salt" that Venetians managed from Crete and Cyprus. Planters, led by merchant Bartolomeo Marchionni, extended their cultivation of sugarcane to the Canary Islands and the Cape Verde Islands.

At Henry's death in 1460, King Afonso V moved the royal trading syndicate to Lisbon. Renamed the Casa da Mina (House of Mina), it received West African shipping from Fort St. George at Elmina, Ghana. Under regulation by the economic officials, the Portuguese merchant fleet imported fish, grain, kola, and salt as well as slaves. Pepper (*Piper nigrum*), which the Portuguese honored as *fume dos olhos* (the light of the eyes), outsold the other foodstuffs.

The Portuguese flourished at trade, earning a profit of 260 percent. A royal agent, Fernao Gomes, initiated exclusive trade in guinea pepper, a sacred Nigerian digestive and flavoring for beer and sausage known as "grains of paradise." For a pungent deterrent to household odor and sickness, homemakers made pomanders out of oranges pierced and permeated with cardamom, cinnamon, cloves, nutmeg, and pepper. Guinea pepper became a European fad, but it eventually faded as Asian black pepper regained prominence in cuisine and

the spicing of ale.

After the Ottoman Turks closed caravan routes from India to Baghdad and Aleppo in the late 1490s, under King Manuel I, the Portuguese inaugurated a third boost to the maritime food trade. On July 8, 1497, Admiral Vasco da Gama commanded two carracks, a caravel, and a supply ship on an expedition to the Indian Ocean. His exploration introduced the “golden route” around the African Cape of Good Hope up the East African trading cities from Sofala, Portugal, to Ethiopia and east to Calcutta and Goa, India. In wresting pepper and spice concessions from Muslim importers, Portuguese traders destroyed the monopolies held by Arabs, Italians, and Turks.

From Calcutta, Da Gama’s fleet of 13 vessels carried 1,700 tons (1,550 metric tons) of spice, more than Venetian competitors sold in one year. To the dismay of Egyptian and Venetian wholesalers, the price of high-quality Kanara pepper from Malabar fell by 20 percent worldwide. To handle the logistics of unloading carracks in Lisbon and sorting and distributing goods, the House of Mina evolved into two divisions, the House of India and the Casa da India e da Guiné (House of India and Guinea).

After merchantmen inaugurated a route to India and back up the Tejo River to the Ribeira Palace in central Lisbon, under King Manuel I, commercial operations generated 65 percent of his nation’s revenue. At the royal compound, the firm built and outfitted vessels, hired cartographers and sea captains, trained its food agents, recorded duties and income, and oversaw contractua agreements. For Manuel’s rule over luxury foods, the French dubbed him the “spice king” and “the grocer.” He depended on the naval expertise of Pedro Alvares Cabral, discoverer of Brazil; Francisco de Almeida, India’s first colonial viceroy and trade negotiator; and Admiral Afonso de Albuquerque, who advanced Portugal to a global sea power in the Indian Ocean and Persian Gulf.

Late in 1500, Portugal’s armadas faced the animosities of Arabia, Bijapur, Calcutta, Egypt, Gujarat, the Ottoman Turks, and Venice, a combined force dominated by Muslims. By building trading forts along the commercial routes, Portugal had little to fear from itinerant privateers, who operated without land bases.

By 1503, the House of India had established its pepper empire and dominated trade licensing and pepper distribution throughout Flanders, France, Hungary,

and Germany. Agents bought pepper in India for 3 ducats per hundredweight and sold it in Lisbon for 22 ducats. Navigators discovered a new cinnamon source at Ceylon (Sri Lanka) in 1505, when cinnamon brought nearly seven times its initial cost.

A year later, through decisive military intervention, Portugal began a climb from dominating 25 percent of Asian trade to controlling half the Asian food market in cinnamon, cloves, and pepper. Shippers transported goods from warehouses at Anjediva Island, Cannanore, Cochin, and Quilon, a source of pepper, ginger, and cashew nuts, an additive to Chinese, Indian, and Thai sauces, stews, and desserts. From the viny environs of Iddicki, Kerala, Portuguese agents collected bagfuls of the world's darkest and most aromatic peppercorns, known in the trades as "black gold."

The Portuguese advanced in 1511 to control the spice harvest in Ceylon and Malabar, India. In addition to merchandising salt fish, the House of India outsold Venetian sugar at Antwerp, Flanders, and Bristol, England. By 1515, the House of India was as wealthy as the nation's Catholic Church. However, aggressive moves by the Dutch, English, and Venetians began dislodging Portugal from command of international trade.

During the next two decades, the Portuguese faltered at commerce because they owned no plantations, lacked control of intra-Asian trade and overland routes, and lacked the sophisticated finances to transport specie from Portugal. The company remained in business until its bankruptcy in 1560, when the Levant (southeastern Turkey, Syria, and Lebanon) reactivated its vigorous commerce.

See also: Abreu, António de, and Francisco Serrao; British East India Company.

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Hudson's Bay Company

The world's oldest merchandiser, the Hudson's Bay Company has dealt in trade goods and foodstuffs since its chartering on May 5, 1670. Originated as a fur clearinghouse, the corporation derived from cartographer and explorer Pierre-Esprit Radisson, a friend of the Iroquois and pelt trader among the Cree, Northern Algonquin, Ojibwa, and Ottawa along Lake Michigan and Lake Superior. Disgruntled by the high-handedness of the French fur licensors, he joined his brother-in-law, Médard Chouart des Groseilliers, in a venture that brought two ships from England to Hudson's Bay under the sponsorship of Sir George Carteret, Prince Rupert of Bohemia, and his cousin, King Charles II.

On June 5, 1668, Radisson, the royally favored entrepreneur, sailed the *Nonsuch* past the St. Lawrence River and approached the trading zone via Hudson's Bay in north-central Canada, a northerly route that reduced the cost of exporting beaver pelts and, to a lesser extent, the fur of lynx, marten, mink, muskrat, otter, and sable. A total of 19 stockholders profited from a monopoly over Rupert's Land, a vast, partially charted territory bisected by numerous streams emptying into Hudson's Bay, covering an expanse larger than Europe.

At Charles Fort on the Rupert River delta, the firm introduced Amerindians and the Métis nation, a literate and multilingual mixed-blood people also called les Canadiennes, to a limited role in a market economy. Natives earned profits primarily on commercial sales of cured or smoked buffalo tongue and pemmican, a native pack supply and Canada's first instant food. Introduction of Europeans to this high-energy, low-volume source of fat and protein enabled explorers, settlers, and the military to abandon heavy stores of bread, porridge, and salt meat and, thus unencumbered, to push farther north and west toward the North Pole, Yukon, and Russian Alaska.

In October 1754, explorer Anthony Henday added the Blackfoot of modern-day Edmonton, Alberta, to the company alliance with indigenous pemmican traders. The business cycle ranged over five months as ships made trades and completed the loop to and from England, where the first 27 lots of furs went on sale at Garraway's Coffee House at Cornhill in east-central London, an auction site for coffee, sugar, tea, textiles, and sea salvage. In 1780 at Witney, Oxfordshire, Thomas Empson expanded the range of trade goods by weaving durable "point"

blankets, which Indians bought for two and a half points, or pelts. Profits from pelts advanced from \$1 million in 1780 to \$6 million in 1800, when the company supplied furriers in London, New York City, and Paris.

Bicultural Business

Based at Fort Nelson, Manitoba, the Hudson's Bay Company fielded more exports than imports, set pricing, and generated its own banks, currency, provisioning storehouses, and maritime fleet. To ensure a working relationship with tribes, until a policy shift in 1806, Hudson's Bay employees typically married Indian woman, who secured a steady supply of food staples and medicinal plants and introduced the men to Amerindian food preservation and diet.

The Hudson's Bay Company spread its control of trade among the nomadic Cree, Eskimo, Ojibwa, and Slave along depots at the ports of the Red and Saskatchewan rivers and into Ontario and Quebec. The company flourished unchallenged until competition from Simon McTavish's North West Fur Company emerged in Montreal in 1783.

Depot managers consisted mainly of Englishmen and Scots with European wives living in log houses. In exchange for exotic European goods—bacon, blankets, buttons and needles, calico, copper kettles, guns, iron chisels, salt beef and pork, sugar, tea, tobacco, and twine—local Indians provided beadwork, birch syrup, dried and cured pike, moccasins, and the meat of buffalo, caribou, deer, moose, and wild sheep. Between 1801 and 1808, their trade in pemmican alone rose by more than 400 percent. Factors (agency merchandizers) introduced incoming Canadian missionaries and European consumers to pemmican, a reliable Amerindian trail food supplied by the Assiniboine, trading partners of the Cree. Traders, canoe expeditioners, and ox-carters consumed pemmican raw, broiled over a buffalo chip fire, or as a basis of stew.

During the mercantile period of colonization, the Hudson's Bay Company seized the Yukon River and dominated trade with the Athabaskan of Chilkoot Pass. Famine among settlers proved so serious on January 8, 1814, that Governor Miles Macdonnell at Fort Douglas issued the Pemmican Proclamation, restricting the Métis from exporting trail meat from the colony along the Red River to their

outlet in St. Paul, Minnesota. At La Souris, Manitoba, Sheriff John Spencer impounded 18 tons (16.3 metric tons) of contraband pemmican from the North West Company, which supplied its 219 canoes with 29 tons (26.3 metric tons) annually.

On June 19, 1816, resisting the restriction of their trade, the Métis rallied under the slogan *le commerce est libre* (free trade), attacked the fort, and seized the pemmican stores. They continued marketing the pemmican to the North West Company, which sold the trail food as far east as France, Great Britain, Switzerland, and the United States.

Expansion to the Northwest

After winning the Pemmican War against its rival, the Hudson's Bay firm expanded its southern routes into present-day Michigan, North Dakota, and Wisconsin and its eastern outreach to Holland, Russia, and Scandinavia. Commodities trade succeeded on a par with the East India Company at global interchange of cod, lumber, minerals, and wheat. The Convention of 1818 established the southern boundaries of the Canadian territory and limited the rights of American fishermen to catch, dry, and cure fish from the coasts of Labrador and Newfoundland. In 1821, the Hudson's Bay Company spanned the continent after it merged with the North West Company and reestablished its monopoly. *Voyageurs*—Métis transporters of goods between whites and Indians—and *coureurs de bois*—free agents who ignored French state and church laws—based their speed on canoes and pemmican. The demand for trail meat usually outpaced supply.

Company scouts set up trade with the Chinook of the Willamette Valley in Washington Territory in 1825, built a Pacific headquarters at Fort Vancouver, and pushed south in 1827 to Idaho, Oregon, Nevada, and California in search of new territory to exploit. The erection of Fort Langley in British Columbia in 1827 added dried salmon to Hudson's Bay Company trade offerings. Colonel Christopher "Kit" Carson, a company agent, pressed into Blackfoot territory on the Yellowstone River.

The Hudson's Bay Company appears to have made its cash on Rupert's Land

at an ideal time. The coming of the Canadian Pacific Railway, the Imperial military, and more prairie pioneers pushed the dispossessed hunter-gatherers farther west toward an unfamiliar new life in agriculture. From 1826, the demand for meat rose from 1,923 buffalo tongues every five years to a height of 25,657 in 1845. In an average year, the Hudson's Bay Company sold meat from 17,000 buffalo. Buyers preferred the flesh of cows above that of bulls, thus hastening the depletion of nomadic herds. In 1843, the Puget Sound Agricultural Company, a company subsidiary, profited from trade in fruits and vegetables, dairy, beef, and pork as far west as Alaska, Hawaii, and Tokyo.

The Post-Buffalo Market

Anticipating shifts in animal populations, company officials at Fort Edmonton tried hybridizing the beefalo in 1844, a failed crossbreeding scheme involving cattle and buffalo. Trade continued to flourish in Saskatchewan in 1846, where Indians sold 1,100 bags or about 50 tons (45 metric tons) of pemmican.

By 1850, the Hudson's Bay Company had begun its retreat from the north-central United States by yielding trading rights along the Columbia River. In 1857, the Canadian Dominion purchased Hudson's Bay Company territory for £300,000 plus trading-post acreage and 6.6 million acres (2.7 million hectares) around Lake Winnipeg and the North Saskatchewan River. In the 1860s, the Métis subdued their Cree competitors and dominated the pemmican trade to the Hudson's Bay Company. While the Indians lost stature and control of trade routes to the railroad, tariffs protecting the white-owned company from John Jacob Astor's American Fur Company sustained British profits. In 1871, prices reflected the tastes of Canadian Indians for domestic meat:

Commodity	Price per Pound
beef	17¢
buffalo	15¢
pemmican	11¢
pork	25¢

According to the newspaper *Les Métis* in 1877, trade in buffalo hides at Red River reached 74,000 buffalo robes, but declining prices forced brokers to broaden their product line to dried and fresh meat and pemmican. Loss of the buffalo reduced the Métis to starvation and begging.

At the near extinction of the buffalo, prices shifted erratically, with pemmican rising in value by 1,150 percent and dried meat by 400 percent. Missionaries and pioneers paid 25¢ per pound for pemmican. Eastern Indian traders shifted commodities to cured or smoked deer tongue, deer-meat pemmican, fish, moose, rabbits, soft and hard game fat, and wild rice, while Western tribes used Winchester rifles to decimate the remaining buffalo herds.

After gold rushes shifted exchanges from trade to cash, the Hudson's Bay fur depots developed into a retail department store chain and mail-order business, beginning in Winnipeg in 1881. As Canada began to face deer and moose shortages, woodsmen protested the uncontrolled slaughter of wild birds, fish, and game and proposed restricting hunting to limited seasons. Differences of opinion about hunting rights destabilized the multicultural society and diminished the Hudson's Bay Company to a historical relic. Winnipeg's old-timers formed the Winnipeg Game Preservation League in 1882 and looked back on the early days of the Hudson's Bay Company as a halcyon era of hunting excursions.

The twentieth century brought new challenges to New World food traders. The Hudson's Bay Company prospered from the sale of candy, canned salmon, coffee, liquor, tea, and tobacco and sidelines in gas, oil, and Inuit art. During World War I, while Norway supplied the Allies with fish, the Hudson's Bay Company distributed frozen meat, wheat, and armaments to Belgium and France via the 300 ships of the company's steamship line.

By 1920, the commissioning of an icebreaker introduced company agents to the eastern Arctic at Inukjuak, Quebec, for trade in arctic fox fur, fossilized mammoth tusks, walrus teeth, whale blubber and oil, whalebone, and salt fish. The establishment of trading posts among the Inuit expanded their knowledge of steel traps, munitions, and European foods—beans, flour, lard, rolled oats, and whiskey and brandy. The Hudson's Bay Company yielded to animal rights protests in 1991 by ceasing to deal in animal fur.

See also: Buffalo; Dried Food; Middens; Pemmican; Supermarkets.

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Hunter-Gatherers

A mobile society of omnivores subsisting on foraging and stalking, prehistoric hunter-gatherers scoured the wild for food for immediate consumption. Hunting-and-gathering societies began in eastern Africa with the first hominids, *Australopithecus afarensis*, a race of primate fructivores, or fruit eaters, that lived up to 4 million years ago. An opportunistic strategy of human life during 99 percent of human history, the scavenging of foodstuffs demanded intense social activity and provided short-term gains for *Homo sapiens* from 200,000 to 10,000 B.C.E. By the end of the period, historians estimate the Earth's population at 4 million.

Nomadic groups gravitated toward the best sources of food— lakes, river estuaries, seashores, and valleys. To sustain life, hunter-gatherers acquired few possessions and stayed on the move. They ranged about their environs in search of birds and eggs, fish, fruit, grass seeds, honey, insects, mollusks, mushrooms, nuts, reptiles, rodents, seaweed, small game, and wild plant varieties. Partially devoured beast kill offered a shortcut to hunting. Residing in an egalitarian cooperative, each member carried the same status and the same responsibility for finding food. Only advanced age added prestige to the individual.

At Abu Hureyra, settled in western Mesopotamia (Syria) in 9500 B.C.E., archaeobotanists have identified 150 high-fiber, high-protein plants and tubers valued as food, including chickpeas, gazelle and donkey meat hackberries, lentils, and pistachios. Mothers bore children at 48-month intervals, a spacing that

prevented too many infants and toddlers for nomadic families to carry.

To prepare barley, rye, and wheat for adult use, girls and women ground the husks off grain with saddle querns (concave grinding stones) over a period of several hours before each meal. Squatting to rotate the grinder caused widespread deformities of the big toe, cartilage erosion in the knees, and disk damage to the last vertebra. Before weavers invented the sieve or potters shaped containers for soaking grain, powdered rock from the quern eroded teeth. Mineral grit that lodged next to molars caused gum infection. The shift from rough grains to porridge allowed mothers to wean infants sooner and to substitute pap and gruel for breastfeeding. The shift to cooked cereals shortened the span between births, introduced sticky carbohydrates to teeth, and increased incidence of dental caries.

Neolithic bands adapted readily to temperate zones as well as to the extremes of the tropics and tundra. Individuals mentally cataloged an extensive observation of flora and fauna within the food web as well as sources of salt. The keenest hunter-gatherers knew the hibernation and migratory patterns of animals and birds and the seasonal efficiency of scouting the most propitious climes, such as groves of bananas and pineapples among the Tupi and Guaraní of Brazil.

Attitudes concerning nature tended toward wonder and magic, the ineffable source of subsistence and offspring. People lived in the present with little thought of guilt, regret, and shame and little anxiety about an afterlife. They cultivated a low standard of living, observed straightforward traditions forbidding food waste, and sacrificed privacy and individuality to a communal mentality. Hunter-gatherers developed sturdy frames—an average of 5' 9" (1.75 meters) for men and 5' 5" (1.65 meters) for women in Greece and Turkey—but tended to die young because of accidents (falls, drowning, and crushing injuries), attacks by fierce animals, or snakebite.

Non-Acquisitive Wealth

Hunter-gatherers of the past and present made no attempt to control nature. They collected only what they could carry and limited their wants, craft items, food stocks, and garments.

Alaskan Eskimo, hunters of bowhead whales, seals, and walrus, thrived on a

diet of 50 percent fat, 35 percent protein, and 15 percent carbohydrate. The Kalaallit of Greenland consumed meals of 96 percent meat from fish and sea mammals; the most prominent meat eaters, the semi-nomadic Nunamiut Inupiat of Anaktuvuk Pass, Alaska, ate caribou and only 1 percent berries.

In contrast, the Hadza of north-central Tanzania and the aborigines of Australia and Papua New Guinea preferred a diet dominated by honey and vegetable matter. The Hadza favored baobab fruit, ekwa tubers, and marula nuts as well as bee larvae, buffalo, dikdik, eland, jackal, tortoise, and warthog. A gendered taboo forced females to choose congolobe berries over meat, while the males opted for meat over berries.

Because of the overhunting of game in the Kalahari Desert, the !Kung in Botswana, Namibia, and South Africa currently consume only 33 percent meat and 67 percent plant food—88 percent of which consists of mongongo nuts, oily kernels that gatherers collect from elephant dung. The proportion of meat and plant foods for the Gwi San bush people of Botswana in the central Kalahari tended toward only one-quarter animal food. When game was plentiful, hunter-gatherers gorged on high-energy meat, a dining pattern common to the Kalahari bush people and to North American buffalo hunters.

Control of fire from 498,000 B.C.E. increased the palatability of food plants and released more nutrients into human metabolism. Homo sapiens further adapted cookery in 18,000 b.c.e. with the first use of grinding stones to separate husks from digestible tissues of nuts and grains. Females interspersed daily tasks of hauling water and combustibles, cracking nuts, and cooking with visiting, sewing, and entertaining. Networks of children assumed responsibility from age five for gathering ground-level foodstuffs, such as acorns, cactus fruit, crustaceans, grubs, quail eggs, and shellfish at low tide. In the least promising environment, men worked no more than four hours per day to feed their families and rarely encountered dental problems, malnutrition, or starvation. During downtime for male hunters, they conversed, copulated, dined, educated the young, and danced and shared leftovers with pet dogs. Such tribes owned no slaves, gave little thought to storing food for the future, and abstained from raiding and war. When conquered, they adapted poorly to a European-style work ethic.

The Casteless Society

After the extinction of giant animals—the bison in North America, dodo in Mauritius, giant lemur in Madagascar, moa in New Zealand, and nene in Hawaii — meat eaters concentrated on antelope, coyote, deer, elk, and raccoon. Migratory tribes followed cyclical routes to seasonal hunting camps and shore sites. From the Great Plains of North America to Chile, tribes of 50–100 members broke into hunting bands of 10–30 to scout more abundant game.

Living in rock shelters or portable tents, families pursued gendered tasks—men hunted; women and children dug roots and gathered fruit, plants, and seafood. Both genders fished. Men typically introduced youths to the dangers of hunting and turned puberty rituals into extensive training sessions in weaponry, slaughter, and evisceration and disjuncting of the kill.

An ample kill of beaver, bison, mammoths, mastodons, musk ox, or reindeer allowed low-density communities to enjoy periods of leisure and the safety and warmth of shelters, a boon to pregnant and lactating women and to their infants and toddlers. Relatively low levels of toil allowed women to breastfeed their children for three to four years. Lactation suppressed ovulation and lowered the birthrate, thus lessening competition for available foods within the clan.

Until the evolution of agriculture around 8500 B.C.E., lives depended on day-to-day flexibility and the sharing of muscle and organ meats and the marrow from cracked bones. Before the age of greed and pillage that accompanied agriculture, hunter-gatherers welcomed outsiders. In contrast with later peoples, the protein intake and hardy lifestyle predisposed Neanderthals to robust muscles, a larger brain and greater cerebral activity, and sophisticated cuisine and cooking tools.

See also: Amerindian Diet; Animal Husbandry; Cannibalism; Fertile Crescent Diet and Food Trade; Grilling; Lapérouse, Jean François Galaup; Paleolithic Diet; Polo, Marco; Polynesian Diet and Cuisine; Shellfish; Soft Drinks and Juices; Swiddens; Wild Food.

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[Huou \(fl. 1270-1330\)](#)

After the birth of the Yuan dynasty in 1260, Huou (Hu Szu-hui), the chef of Kublai Khan's imperial kitchen became medieval China's first native gastronome and an originator of fusion cuisine. At the Forbidden City, a bastion of wealth and power at Dadu (Beijing), Huou inserted food knowledge of Turkish origin and Islamic dietary advice. He lived during a period of discovery, including the development of macaroni and ice cream and of charcoal-and oil-fired cook stoves and flowing water to the kitchen. As a master chef, he cooked for a luxury-loving emperor, an obese gourmand who subjugated the southern Sung. Each recipe had a medicinal property intended to prevent sickness and extend longevity from such ingredients as bottle gourd and cardamom.

Information about Huou is available mainly through inference about the khan's kitchen demands on his dietary physician, who replaced hunter-gatherer fare from Mongolia with subtle, cosmopolitan cookery. According to legend, the khan invaded Moscow at age 23 and returned with a recipe for steak tartare, raw minced beef or horse meat seasoned with capers that honored the bold Tartars (Mongols). Although open to new dishes, he also insisted that his staff preserve Mongol cuisine and pay no heed to the scriptural food demands of China's Muslims.

Huou's era saw the politicizing of menus after 1271, when the defeated Chinese Tang dynasty rejected lamb as a protest to northern insurgents. Kublai Khan intended to turn Dadu into a world cultural and trading hub with a blended

Mongo-Turko-Chinese cuisine. Wracked by alcoholism and gout in his 80s, he demanded fine ingredients and wines from Baghdad, Kashmir, and Manchuria. Huou turned the food delivered via the Silk Road to the Dadu palace into such specialties as carp cakes with asafetida and eggplant with orange-flavored lamb stuffing.

To assuage the humiliation of his failed invasion of Japan in spring 1281 and his grief over the deaths of his favorite wife, Chabi, in 1281 and their second son, Crown Prince Zhenjin, in 1285, the khan demanded a constant supply of food and koumiss (fermented milk) from the 10,000 imperial white mares. As a warning about dissipation to the 69-year-old emperor, Huou followed the Tao by endorsing moderation in food, alcoholic consumption, and sexual pleasure.

Although Kublai Khan dressed in the Chinese fashion, he dined regally at the palace on kid and lamb dishes, a Mongol specialty, until his death in 1294. In the royal kitchen, Huou's staff barbecued meat and distilled rice wine. Under the direction of Egyptian specialists, the sous-chefs refined sugarcane into crystals for confections. Workers slew four or five sheep daily and boiled them in huge vats for the khan's pleasure and diet therapy.

From service to the mid-thirteenth-century khan, Huou recorded pantry tastes and feasts honoring the Celestial Throne. His three-volume survey, *YinshanZhengyao (Proper and Essential Things for the Emperor's Food and Drink, 1330)*, China's first cookbook, compiled court details. The text features 236 recipes for vegetarian soups in sheep stock and *congees* (watered gruel) of donkey's head and fox and such delicacies as pomegranate baklava and lightly sauteed spinach sprinkled with sesame seeds. Grape vintages, according to the book, have the power to relieve worries and improve digestion, but overindulgence can kill. In a scholarly preface, Yu Chi, a court official, proposes that diners aim for a harmony of yin and yang and that they conserve their strength to lengthen their days.

The Empress Babusha approved Huou's cookbook and had it engraved on woodblocks for dissemination. The text, the first record of food boiling, warned of unsafe combinations, notably eggs with turtle and sugar with shrimp. It featured line drawings of the wolf and the crab, a Mongol fad food. At Shandu (Xanadu) in Inner Mongolia, the location of the bamboo and marble summer palaces of the khan, Venetian adventurer Marco Polo, a contemporary of Huou, corroborated the trend toward crustaceans by describing crabs for sale in

specialty shops.

See also: Polo, Marco.

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Hybridization

Hybridization of food sources, which dates to paleoagri-cultural techniques, altered global thinking about farming and the sustainability of life on the planet. In plants and animals, natural interbreeding continues food species as well as diversity, as in the cases of bread wheat (*Triticum aestivum*), Haas avocados, Indian mustard, navel oranges, sweet bananas, and wild grapes. From as early as 13,000 B.C.E., neolithic farmers altered the natural habits of fruit and grain, beginning with Chinese and Indian strains of rice. Nomads spread their stock across similar terrain, breeding barley, beets, oats, and einkorn and emmer wheat in the Mediterranean and maize, manioc, millet, plantain, rice, sorghum, soybeans, and sweet potatoes in the savannas. In the tropics, the lowlands produced coconut, the highlands the potato, and the forest sugarcane.

The manipulation of crop and livestock species facilitated enormous genetic modification, as in lysine in corn, iron-rich broad beans, oversized greengage

plums, and vitamin A in rice. In one of the greatest achievements, around 3000 B.C.E., the Anasazi hybridized maize from teosinte, a wild Mesoamerican grass, and evolved corn varieties suited to a hot, dry climate.

German botanist Joseph Gottlieb Kölreuter reported the first artificial hybridization in 1761 through artificial pollination. A century later followed the field research of William James Beal, Charles Darwin, and Gregor Mendel.

Modified Plants at Work

Hybridizing passed from the laboratory to the farm by 1875, when U.S. farmers were testing crossbred oats. By such transgenic means, human plant growers expanded food production to 5 billion tons (4.5 billion metric tons) per year and foresaw such health benefits as bananas that protected children from enteritis. However, the benefits lasted for only one generation of bananas and required on going genetic upgrading.

The success of new food species is obvious in the beetle-resistant Bt (*Bacillus thuringiensis*) potato and the long-lived Flavr Savr tomato, but less so with the loganberry and the triticale, a cross between rye and wheat used in Europe as a livestock feed grain. In the early 1900s, the British navy purchased the early fruiting loganberry, a cross between blackberry and raspberry, which became a valuable source of vitamin C that prevented scurvy in sailors.

The grapefruit originated naturally in the Barbadian or Jamaican wild from the pomelo and sweet orange. The blended citrus species entered scientific notation in 1837 and passed to subtropical Florida. The grapefruit thrived as a commercial crop in Orange County in 1870 for shipment to New York City and Philadelphia.

Grapefruit became a culinary success in 1929 with the patenting of the Ruby Red, followed in 2007 by the Rio Red, a Texas specialty. Nutritionists recommended aromatic fruit for lowering cholesterol, burning body fat, slowing aging, and adding antioxidants to the diet. When crossed with the tangerine in 1897, grapefruit generated another popular hybrid, the uniquely flavored Minneola tangelo, or honeybell, a popular winter gift item and table fruit.

Genetic Modification

Genetic engineering applies high-tech methods to the refinement of genes. Laboratory manipulation improves the commercial and nutritional value of plants by increasing domestication of wild species, antibiotic resistance to fungus and pathogens, and the viability of crops near brackish water, an advance that boosts the value of coastal land for farming such grains as Yecoro wheat, a moderately salt-tolerant variety. From 1903 to 1904, American plant geneticist George Harrison Shull invigorated hybrid corn to yield predictable results. More detailed data on corn DNA emerged from the later work of cytogeneticist Marcus Morton Rhoades, a generator of higher corn yields.

In 1925, Italian agronomist Nazareno Strampelli directed *La battaglia del grano* (The Battle of the Grain), a national effort under dictator Benito Mussolini to make Italy self-sufficient. On heavily subsidized *latifundia* (plantations), Strampelli's early-ripening dwarf wheat, hybridized from the Japanese Akagomughi strain and inoculated to resist smut, doubled the yield by 1939; Italy exported seed to Sonora, Mexico, that shortened the growing season and enhanced yield and disease tolerance. Pasta makers today continue to purchase Strampelli's Senatore Cappelli variety of durum wheat. The work of Orville A. Vogel with Norin 10 wheat in 1948 introduced a valuable addition to grain cultivation in the Pacific Northwest, Mexico, and Russia.

Building on Vogel's developments, American microbiologist Norman Ernest Borlaug, the "Father of the Green Revolution," decreased food shortages in India, Mexico, and Pakistan by researching advances in barley, maize, sorghum, and triticale. His major breakthrough, semi-dwarf wheat, resisted stem rust and adapted to lowlands and highlands, thus doubling the annual yield. Grown on shorter, thicker stalks, the larger seed heads thrived in 1963, when Borlaug's wheat accounted for 95 percent of Mexico's harvest. The success altered the nation from an importer to an exporter of wheat.

A similar rescue mission underwritten by the U.S. Department of Agriculture applied Borlaug's expertise in the mid-1960s to war time famine in India and Pakistan, brought on in part by rice stunt and annual monsoon rains. The crop, particularly in the Punjab, swamped the region's labor force and transportation and storage facilities.

Through Borlaug's theory of intensive monoculture (growing a single crop), both India and Pakistan supplied their nation's demand for food. The application

of hybrid short-stalk wheat achieved similar successes in Africa, Central America, and the Middle East. Borlaug's genetic tinkering also influenced rice cultivation throughout Asia. In 1970, cereal crops increased their yield by 10 percent. For ending decades of chronic undernourishment and for slowing deforestation and wildlife extinction worldwide, Borlaug received the 1970 Nobel Peace Prize. In 1984, he came out of retirement to introduce his methods in famine-plagued Ethiopia. Within a decade, Ethiopians achieved nearly a one-third increase in grain productivity.

Looking five decades ahead, Borlaug predicted that agriculture would have to double yields by 2050. After saving more than 1 billion people from hunger through grain hybridization, he targeted Africa, Brazil, and former Soviet Russia as still in need of bioengineering of sustainable crops and a reduced dependence on herbicide use, for example, by introducing Bt toxins in peanuts to protect them from European corn borers. In opposition to high-cost organic farming, he advised researchers to boost the protein quality of corn and to continue transgenic plant manipulation through recombinant DNA techniques, chromosome engineering, and improved fertilizer efficiency. He predicted heightened resistance to rust to supply enough barley, corn, rapeseed, rice, sorghum, soybeans, sugar beets, and wheat to meet global food needs.

In recent years, consumers leery of genetically modified (GM) foods assaulted the media and government agencies with outrage against " Frankenfood," a Gothic term suggesting an oversized monster raging out of control. Anti-GM forces in Canada and the United States protested processed foods that incorporated such altered ingredients without warning the public. The outcry in Europe forced the European Union to declare a moratorium on the sale of GM seeds. In October 2011, BASF sought approval for Fortuna, a GM potato that resists blight, the source of the Irish Potato Famine in the 1840s. The following month, Monsanto informed Pakistanis of the benefits of GM corn in an attempt to alleviate doubts about the safety of genetically modified foods.

See also: Blueberries; Burbank, Luther; Frézier, Amédée François; Genetically Modified Food; Hanna, Gordie C.; Heirloom Plants; Hiatt, Jesse; Ketchup; Livingston, A.W.

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Hydroponics

See Aquaponics

I

[Ibn Battuta \(1304-ca. 1378\)](#)

An Arab theologian and traveler over three continents for 30 years, Abu Abdullah Mohammed Ibn Battuta perused the customs and food consumption of disparate peoples and seagoing crews. His account of the Middle East, North Africa, and central Asia is the most comprehensive of the Middle Ages.

An Islamic academic born of Berber stock in Tangier, Morocco, Ibn Battuta left home on June 14, 1325, and traveled the world by land and water before publishing a memoir, *Tuhfat al-Nuzzar fi Ghara'ib al-Amsar wa'Ajaib al'Asfar* (*On Curiosities of Cities and Wonders of Travel*, 1354). Along the way, he observed the importance of diet and food to Muslims, who welcomed a fellow believer with gifts and feasting.

As he passed through Tunis, he encountered the typical urban food trade—citrus fruit, dates, dried and smoked fish, kebabs, pastries, sherbet, spices, and wines and water mixed with fruit juice. He avoided the limited fare of small towns in favor of the cosmopolitan menus in metropolises. Alexandria's wealth staggered his imagination with its immense bazaar, offering goods from Africa, India, and Malaysia.

From the opulent Nile port in spring 1326, he cruised upriver to Cairo, where Iraqi and Syrian refugees clogged the city. Because of the absence of kitchens and pantries for the homeless, the outsiders fueled a brisk business in street food. Buyers consumed their purchases amid sweaty throngs and the dung of camels and donkeys.

Devotion to Islam motivated the Moroccan's itinerary, which varied and shifted because of local wars. After fasting for Ramadan in Damascus, Syria, he set out on a hajj (annual Muslim pilgrimage) and an obligatory stop in Mecca, Arabia, the cradle of Islam. In obedience to the Koran's call for charity, Mamluk authorities provided dray animals, food, skins of fresh water, and medicine for poor Muslim pilgrims. Travelers packed combustibles and cooked along the way

in copper cauldrons. Grocers raised food prices to bilk rich pilgrims of their funds.

Ibn Battuta reached Mecca on October 26, 1326. Inside the Great Mosque, he observed, pilgrims could eat and sleep but not cook. At Tabriz, in northwestern Iran, he admired a world-class food bazaar selling multinational goods and dined heartily on bread, meat, rice, and sweets. The stopover established his love of fine dining, which he satisfied along the Silk Road, Eurasia's chief trade route.

Middle East and Africa

On November 17, 1326, Ibn Battuta continued moving east and south. He joined a caravan through Persia and journeyed by night in a litter before boarding a lateen-sailed sloop in Mesopotamia from Basra, Iraq. The boat moved along the Ubulla canal toward the Tigris River. Overhanging the route, fruit orchards and palm trees shaded the passage. Inland at Kufa, Iraq, citizens offered bread, dates and fruit, fish, and milk. At 'Aydhab, Sudan, on the African side of the Red Sea, he observed the exquisite trade goods of the Silk Road, which brought sugar to Muslim kitchens. Beja islanders on Awakin had to collect or import potable water and lived on a diet of gazelle, goat, ostrich, and wild ass along with butter, milk, and millet. Unfortunately for his appetite, heat and brackish water soured his stomach. By the end of his first year on the road, he had covered 4,000 miles (6,400 kilometers).

The route took Ibn Battuta into the Indian Ocean to Somalia on Africa's eastern horn. On the Gulf of Aden, he avoided Zeila, where the air around the meat market carried the stench of slaughtered camels and fish. Farther south in Mogadishu, the voyager observed street fare, mostly bananas and seafood, sold by Arabic, Bantu, and Swahili speakers. When local dignitaries learned that the visitor was an Islamic scholar, he received welcoming servings of areca nuts, betel leaves, and a carafe of rosewater, a skin emollient, sweetener, and air freshener that he shared with the ship's captain. Among students of religion, the traveler entered the home of Sheikh Abu Bakr for three days of hearty dining on rice steeped in ghee and topped with chicken, fish, meat, and vegetables. Accompanying the dinner, dishes of bananas in milk, curry, pickled chilies, and

lemons over mango and milk increased his pleasure in sour dishes, which local people served with a bland base. He commented on the gluttony of his hosts, who were obese.

Eastern Europe and the Levant

The Moroccan preferred wealth to poverty. After days of sumptuous treatment at the island of Kilwa (off present-day Tanzania) on the East African coast, Ibn Battuta disdained the peasant life in mud and wattle huts and

their coarse meals. He admired Sultan Abu al-Muzaffar Hasan for sitting and eating with humble people. Hospitality gifts poured in to Ibn Battuta, ranging from clarified butter and sacks of grain and rice to a bull. When he moved on in May 1332, he found the ruler of the Golden Horde, Khan Ozbeg, a new convert to Islam, camped north of the Azov Sea in the Ukraine. The khan's massive entourage included portable bazaars, kitchens, mosques, and 300 wagonloads of clothing and food. In July, Ibn Battuta separated from the khan at Astrakhan, Russia, on the Volga River delta to escort Bayalun, Ozbeg's pregnant wife, to Byzantium for the birth of their child. For the trip, Ozbeg supplied 5,000 cavalry, 500 bodyguards, 400 wagons, and a personal staff of 220.

In Byzantium, Ibn Battuta visited street markets and viewed the wonders of Hellenism and the onslaught of Christianity in defiance of the advance of Islam. In Anatolia in 1333, he found the food delicious and remarkably sanitary. Fraternities of young men called him brother and treated him hospitably at bountiful feasts.

At the beach town of Azak, he noted the coarseness of the emir's table service for the rich. Despite being aristocrats, they ate boiled horse meat and mutton, macaroni, and millet porridge and washed it down with millet beer and koumiss, the Mongolian staple beverage fermented from mare's milk. Affronted by the violation to the Koran, he learned that Mongol Muslims allegedly drank alcoholic koumiss for medicinal purposes. During Eid al-Fitr, an annual movable feast ending Ramadan's fasting, Ibn Battuta observed the khan staggeringly drunk at afternoon prayers. Among the Uzbeks, the Emir Timur dazzled the newcomer with a wealth of fruit served in Iraqi glassware on gold-embroidered silk

tablecloths.

Hindus and Muslims in India

Traveling with commercial camel trains, Ibn Battuta returned to Mecca. He reached India in early spring 1333 and accepted appointment as Delhi's hospice administrator, a post he held for eight years. Court life suited the Moroccan, who gloried in royal functions and dinners, horse dancing, and an elephant salute from uplifted trunks. At the palace of Sultan Mohammad bin Tughlaq at Delhi, a staff of 460 included a hierarchy of chefs and waiters. Table service of gold and silver bowls and ewers by attractive maidens involved ladling food from copper trays onto plates. Each wife served her husband by superintending his place setting and washing his hands. Royal dinners ended with distribution of sweets and buttermilk or curds. A gesture of hospitality, gifts of betel leaves for after-dinner chewing cleansed the breath and acknowledged the nobility of the guest. A similar passing of betel leaves and rosewater ended Muslim funerals.

Outnumbered by infidels, the Moroccan surveyed Hindu abstinence from meat and alcohol. Religious tenets limited meals of the devout to rice, sesame oil, and vegetables and forbade wine. Strict separation from Muslims disallowed Islamic visitors and prevented Muslims from handling Hindu dishes and utensils. Ibn Battuta described the gathering of wild grain, which the poor beat in a wood mortar until the white kernel separated from the husk. Cooking kernels in buffalo's milk turned the grain into a stew for baking. He approved the Hindu diet of barley, lentils, millet, mung beans, and rice but sampled taboo foods. He relished a breakfast of peas and enjoyed chapati bread fried in ghee, meat kebabs, minced meat with nuts and onions, and damson plums and admired the use of fruit—coconut, grapes, mangoes, oranges, and pomegranates—in refreshing desserts. A surprising processed fruit, dried watermelon became a lucrative export from Delhi to Mecca.

In summer 1335, a calamitous seven-year famine began killing thousands of North Indians. Survivors resorted to meals of animal pelts, spoiled meat, and human remains. The Moroccan donated his own foodstuffs to save the stricken and ordered grain transported to Delhi to feed the poor. Culture shock overcame

him when he saw violations of Koranic abstinence from alcohol.

On August 2, 1341, Ibn Battuta traveled from Calicut by junk, which offered stewards and room service. At Sudkawan (present-day Chittagong), he found a port so stocked with farm produce that he listed prices of cotton, meat, poultry, oil, rice, and sugar.

On July 22, 1342, Ibn Battuta set out on an official visit to China. Shipwreck off the Malabar coast of India forced him to the Maldiv Islands, where he remained for 18 months at Mahal. He served the islands in the official capacity as judge before moving west to Ceylon in August 1344. During his sojourn, he took four wives and joked that he subsisted on coconuts, a known aphrodisiac.

Later Travels

Subsequent voyages took Ibn Battuta to Beijing, China, and south to Sumatra and back to Calicut. Before embarking, the crew stored two elephant loads of rice, ten sheep, two buffalo cows, and four pounds of julep, a common Arab antidote to stomach upset. At sea, he protected his health by eating lemons, an antiscorbutic valued by mariners. Galley supplies of pickled ginger, lemons, mangoes, and pepper arrived in earthen storage jars distributed from the trading port of Martaban on the Gulf of Burma. In addition to pickles, the crew ate dried ginger, perhaps as an antidote to seasickness, and grew vegetables in wood tubs, possibly a source of bean sprouts or greens.

At Baghdad in January 1348, Ibn Battuta initiated another pilgrimage to Mecca. On returning to Damascus in July 1348, he observed the onset of the Black Death. To combat bubonic plague, Argun Shah, the governor of Syria, encouraged people to avoid eating at public markets. He charged polluted air with infecting the populace and recommended meals of fruit and pickled onions and baths in rosewater and vinegar. For buboes, physicians urged the sick to coat them in egg yolk and to sprinkle bed linens with flower petals.

Ibn Battuta returned home to Morocco in November 1349 but determined to visit Africa. By caravan, he crossed the Sahara in fall 1351. Along the route to Taghaza in northern Mali, he found salt miners living on bitter water, camel haunches, and sacks of dates. Bags of salt and spices served as common currency

for the purchase of food and lodging. Farther south, he mused on the subsistence of West African communities on millet porridge and milk and on the availability of water and fresh honey in rotted baobab trunks. He found verdant areas rich in apple, apricot, peach, and plum orchards and gardens producing peanuts, an ingredient of fried cakes and a source of cooking oil. At Walata, he examined the planting of watermelons in shady date groves.

A visit to Mali's capital—probably Niani—on June 28, 1353, left the traveler bedridden for eight weeks from eating undercooked or tainted yams. An emetic of anise and sugar did nothing to rouse him. Upon his recovery, the sultan sent beef fried in shea butter, bread, and a gourd of yogurt, a humble repast that insulted the Moroccan. In retort to poor hospitality, Ibn Battuta recorded that many Malians ate asses, dogs, and vultures. An encounter with a Berber included a meal of cow's milk, spitted goat, and roast mutton.

At age 49, the traveler returned home to become a judge at Fez. At the prompting of Morocco's Sultan Abu Inan Marini, Ibn Battuta began dictating the *Rihla (Travels)* in 1354. The travelogue, completed on December 9, 1355, was the work of redactor Ibn Juzayy. It earned the name "gastronomical atlas of the Orient."

See also: Breakfast; Currency, Food as; Kebabs; Medieval Diet and Cuisine; Nuts and Seeds; Silk Road.

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Ice

Frozen water, the planet's most abundant solid and most efficient food preservative, chills food and drink to add variety and texture to cuisine and refreshments. In the ancient world, a store of ice in ice caves or ice houses distinguished the dining of royalty and aristocrats. For their signature sorbets, Persian ice masters beginning in 1700 b.c.e. packed frozen chunks in ice sheds or in subterranean caches amid insulating ash, clay, goat hair, lime, sand, or sawdust and a topping of straw.

Similar systems of harvesting and insulating ice and snow served the Chinese along the Yangtze River around 1100 B.C.E. and the Inca in the Andes Mountains. Alexander the Great in 332 B.C.E. served ice in summer fruit ades to Macedonian soldiers. At Petra in Jordan, he had 30 trenches filled with snow and topped with oak limbs to preserve his impromptu chilling technology. At Constantinople, a similar method of storing ice blocks in holes—sprinkling them with water and covering them with shore rushes—kept ice on hand into summer, when beverage sellers sold iced sweets on public streets.

Athenian chefs and the Roman Emperor Nero dispatched servants with ice carts and sledges before dawn to transport blocks from frozen slopes for cooling evening meals and drinks. Street vendors lined their wine counters with snow and turned the cold crystals into honeyed drinks incorporating fruit puree and wines. The ancient Greek physician Galen of Pergamum recommended snow as a method of keeping fish from putrefying by establishing a barrier against oxygen and against the dehydration of natural juices.

Table Art

Medieval cooks applied ice to specific tasks, such as the immediate chilling of new beans or peas in fourteenth-century France to halt cooking and retain crispness. Culinary displays in Asia and Europe involved exhibitions of complex ice sculptures for banquets. Shapes such as pensive Buddhas and filigreed lanterns became conspicuous symbols of wealth when rendered as transparent objects that rapidly degraded into water. The planes and surfaces reflected

flickering candlelight and stimulated conversation among diners.

In the Renaissance, manor houses, especially in Naples, sported conical or domed ice mounds or north-facing wells set in cool glades near springs. To add steam to baking, Italian pizzerias began adding ice cubes to the oven floor before baking focaccia or pizza. Peasants pressed snow into frozen blocks, which remained solid in *dogana della neve* (snow warehouses) into summer months for use in beverages and confections.

Late Renaissance food service required a *garde manger* (food keeper), a chilling room or cold cellar for storing sculpted butter, carved vegetables and fruits, chilled soups, cold cuts, fruit ices, game, hors d'oeuvres, molded salads and terrines, and patés. Dessert specialists prepared snow desserts with wire whisks, which fluffed and separated the ice crystals.

After 1573 at the court of Henry III of France, wine service by the royal *bottigliere* (cellar master) required a dollop of ice or snow in each glass. The chilling of brandy into a table liqueur in Paris preceded the sale of lemonade as a medical restorative. Joining other European doctors, however, Laurent Joubert, physician to Catherine de' Médici, warned that too much cold in food could upset a delicate physical balance, causing painful postdinner headaches or apoplexy.

Business

In the seventeenth century, ice sales introduced a lucrative trade. Natural surface freezing of lakes and streams created ready supplies, as with the Thames in England and Walden Pond in Massachusetts Bay Colony, though the British never developed the taste for chilled foods equivalent to that of North America. In this innovative era, showy table displays included ice sculptures surrounded by fish, shellfish, and sorbets, particularly for buffets, brunches, and wedding receptions. Popular shapes ranged from birds, fish, and flowers to fanciful arches, flames, palaces, water spouts, and waves.

In the early 1800s, entrepreneurs shipped Norwegian ice to Great Britain and blocks from Silver Lake in Rochester, New York, to the American South and the West Indies. In the coldest parts of January and February, employees used augers and ice saws for cutting, ice tongs and pike poles for stacking, and pulleys and

conveyor systems to load supplies on wagons and into factories.

Ice chunks helped prevent spoilage at abattoirs, breweries, creameries, curing plants, dairies, drugstores, meat markets, and packing houses. Hospitals along the Hudson River incorporated ice into treatments for swelling and pain. Sellers of ice touted its value in the slogan “nature’s gift to everybody.”

Health

During a yellow fever outbreak in August 1805, Frederic Tudor of Boston shipped the first load of ice, 130 tons (118 metric tons), to Caribbean hospitals. Within two years, he increased his shipment to 240 tons (218 metric tons) to Havana, Cuba, and acquired a monopoly on the ice trade to the West Indies. His success in the ice business in Calcutta, India, the island of Martinique, and Rio de Janeiro, Brazil, as well as in Southern U.S. cities—New Orleans, Savannah, and Charleston—earned him the nickname “Ice King.”

Although inventor Nathaniel Wyeth designed an insulated ice storage shed in 1825 at Cambridge, Massachusetts, the health conscious began demanding greater oversight of water sources and storage sanitation. Cutting into Massachusetts vendors’ trade, Maine ice operators sawed exceptionally pure blocks from the spring-fed Kennebec River and deposited them directly into ships’ holds. In 1844, Chicago Mayor Alson Smith Sherman peddled ice to city dwellers. The trade developed into a major employer of tens of thousands of ice workers and distributors.

The use of domestic ice in the United States increased in the mid-1800s, after companies began delivery by horse and wagon to home ice chests, wooden boxes that held block ice. The business surged during the Civil War and peaked in 1870, when it reached an annual profit of \$267,000, mostly from sales in Atlantic Coast cities. Gustav Franklin Swift, Chicago’s meatpacking mogul, upgraded the ice bunker insulation of railcars, patented in November 1867 by J.B. Sutherland of Detroit, and enabled Swift & Company to ship freshly butchered beef to distant states. At points along the route, ice shovelers refreshed each car by topping off food mounds. The shipping of meat rather than livestock turned a seasonal business into a year-round bonanza for farmers and packers.

For the sake of public health, Pennsylvania and New England ice harvesters obeyed laws against taking blocks from such polluted sources as the Schuylkill River. Too late, French ice harvesters at Rennes in 1899 discovered that champagne served with ice polluted by sewage in the Vilaine River spread typhoid fever to an entire military regiment.

Commercial Freezers

From the 1870s, commercial chilling introduced to coastal communities large-scale preservation of halibut, salmon, and shellfish, a deviation from the high-sodium content of salted fish and meats. The Gitga'at people of Hartley Bay, British Columbia, also packed seaweed in ice after the drying season passed. Poultry farmers discovered that they could lengthen the shelf life of eggs by storing them in ice houses.

At the 1893 World's Columbian Exposition in Chicago, artificial ice manufactured with ammonia coils won an award for engineers at the Frick Company of Waynesboro, Pennsylvania. North American ice merchants on the Pacific Coast began shipping to Hawaii, Hong Kong, and the Philippines in 1898, when meatpackers introduced Oceania to American tastes in beef and game. A broadened choice of meat suppliers enabled cooks to refine their recipes to exact standards of flavor and texture.

Because chemical softening rid water of magnesia and sulphates of lime, the food-saving quality of pure commercial ice spread from Britain to Australasia and New Zealand, two shippers of lamb and mutton, and to Argentina, a competitive global source of beef. Steamers supplying U.S. troops in Manila during the Spanish-American War maintained cold storage and ice plants for the use of provisioners and hospital staff.

The growth of ice making in South Africa at Cape Colony and Transvaal decreased the price of meat, which previously had spoiled in hot weather. By 1899, builders began erecting ice plants in the Orange Free State in South Africa and Singapore, in Hawaiian clipper ships and Nova Scotian fishing fleets, and at malt liquor breweries in Cuba and Puerto Rico.

According to reports in the *Cold Storage and Ice Trade Journal*, when demand

exceeded supply in March 1906, New England's ice harvesters looked toward Michigan, Ohio, and Wisconsin and as far south as Missouri to supplement sources. Supplies sold to homemakers and barkeepers at 15¢ per hundred pounds (45 kilograms). Ice blocks in refrigerated railcars preserved cheese, fruit, meat, and vegetables for cross-country transport. One Missouri farmer made a profitable ice cake by directing a stream of spring water into a wood box measuring 20 feet (6.1 meters) on each side and drilling out pieces for sale.

Modern Ice Making

By 1915, the creation of a small ice compartment in Frigidaires allowed homemakers to insert their own metal ice trays for freezing. The invention of the ice cube maker made it possible to keep ice year-round. All in all, ice had become a necessity, not a luxury. While sellers of natural ice supplied grocers' freezers and railcars, ice generators crystallized and dispensed pure bag ice as flakes, blocks, and cubes for use in boating, camping, fishing, and picnicking.

Today, flake ice suits the needs of fishermen and fish restaurants because of its delicate surface, which chills without denting flesh. Gourmet ice makers spray water upward to produce layered freezing that is free of air bubbles and clouding by carbonate of lime or other impurities. Hawaiians value shaved ice for cooling treats in a variety of flavors, a recipe similar to the Filipino dessert halo-halo, a mix of shaved ice with evaporated milk, fruit, and sweet beans.

See also: Escoffier, Georges Auguste; Fish and Fishing; Maritime Trade Routes; Shellfish.

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Ice Cream

A sweet frozen dessert marketed by the dairy industry, ice cream is a versatile basis for cake and fruit or syrup and a popular side dressing for choux pastry, pie, and Yule log cakes. When served in cones and sandwiches or on a stick, ice cream appeals to children and to attendees at parks and sports events. Favorite flavors tend toward chocolate, strawberry, and vanilla with international variants—Chinese mung bean, Greek fig, Italian tortoni (almond and maraschino cherry desserts), Japanese green tea and red beans, and Turkish *salep* (orchid tubers).

History

The history of ice cream began around 2000 B.C.E. with snow, the basis for Chinese snow cream treats. Simultaneously, Mongol horse men carried cream in animal intestines. While traveling the Gobi in frigid weather, they agitated the cream while it froze. Around 400 B.C.E., Persians invented *faloodeh*, a chilled sorbet of thin vermicelli blended with lime and saffron, sweetened with honey and rose syrup, and topped with pistachio nuts. In 335 B.C.E., Alexander the Great developed a liking for snow blended with nectar. In China from 200 B.C.E., cooks mixed rice with frozen milk for an early sherbet. They chilled containers with saltpeter and snow, which lowered the freezing point. Under the Emperor Nero, after 54 C.E., gala Roman dinners ended with gelato, a honey-and snow-based dessert and forerunner of Renaissance ice cream.

In the decline of the Byzantine Empire, Asians developed iced desserts to a height of enjoyment. Arabs carried their expertise west after the armada of 200 ships under Caliph Uthman ibn Affan of Damascus invaded Sicily in 652 C.E. In

Baghdad, Damascus, Cairo—wherever Arab cuisine flourished in the 900s C.E.—chefs stirred up dairy desserts and added the scent of rosewater, the sweetness of cane sugar, and the texture of fruit and nuts. To the east after the birth of the Yuan dynasty in 1260, Huou, Kublai Khan’s imperial chef, became late-medieval China’s first native gastronome and an originator of ice cream recipes. After 1526, in Delhi, Indian dessert makers treated Mughal aristocrats to iced fruit custard.

Along with Renaissance ideals, European applications of iced dairy treats moved north from Florence to Paris, St. Petersburg, and Vienna. In 1533, Catherine de’ Médici, the Florentine bride of Henry II of France, arranged continental menus that concluded with “cream ice,” granitas, profiteroles (cream puffs), sherbet, and zabaglione (egg custard). Neapolitan scientist Giambattista della Porta discovered a secret of freezing in 1589, when he mixed ice and salt as a rapid cooling agent. French chemist and food writer Nicolas Lémery of Rouen, the royal apothecary of Louis XIV, published the first French ice milk recipe in *Recueil de Curiositéz Rare et Nouvelles de Plus Admirables Effets de la Nature* (*A Selection of Rare and Innovative Curiosities of the Most Wondrous Phenomena of Nature*, 1674).

Farther east, ice cream maintained its cachet at the courts of Catherine the Great of Russia and Gustaf III of Sweden. After 1682, Peter the Great of Russia promoted flaky pastries, champagne, and decadent chocolates and ice cream for dessert, a treat reserved for the imperial table because of the high cost of refrigeration. The imperial delight in iced desserts remained in vogue after the coronation of the Emperor Alexander II in 1856. In Vienna on October 1, 1716, journalist Lady Mary Wortley Montagu observed Austrian plutocrats displaying dishes of ice cream at elegant Kolhmarkt stalls as privileges of wealth.



Baked Alaska—ice cream on a bed of sponge cake and covered with meringue, heated in the oven to create a hard shell—commemorates the U.S. purchase of Alaska on March 30, 1867. However, National Baked Alaska Day is February 1. (*Larry Crowe/ Associated Press*)

Following the popularity of dairy drinks in coffeehouses and milk bars in the mid-1700s, sweet French dessert cheeses and festive custard and berry ice cream in London cookbooks migrated to the North American colonies. Pure vanilla remained popular as a flavoring at the Philip Lenzi confectionery, America's first ice cream parlor. After opening in 1774 on Dock Street in New York City, three years later, the London-born caterer advertised his frozen cream desserts and water ices in the May 12 edition of the *New York Gazette*. In 1789, Thomas Jefferson, the U.S. envoy to France, brought home to Monticello an 18-step recipe for ice cream in pastry shells and enough vanilla beans to enrich the filling.

Presidential cravings for ice cream enticed George Washington to install “cream machines for ice” at Mount Vernon. Dolley Madison introduced ice cream desserts at James Madison's second inaugural feast in 1813 as a state dish. Jefferson's cousin, Mary Randolph, issued a dessert collection in *The Virginia House-Wife: or Methodical Cook* (1824), the first American anthology to feature ice cream and sherbet. The hand-operated churn with a two-spatula dasher and crank, which New York inventor Nancy M. Johnson patented in 1843, scraped ice crystals from the barrel and broke up air pockets. The device made frozen

desserts available to the house holder in 20 minutes.

Technology democratized ice cream. In the 1860s, a decade after the opening of the first ice cream factory in Baltimore in 1851, the dessert became a by-product of American breweries. In 1863, before President Abraham Lincoln's formal recognition of Thanksgiving, the Second Wisconsin Volunteers at Arlington, Virginia, indulged in a lavish menu of turkey rounded out with ice cream and sparkling Catawba wine. Post-Civil War innovations yielded confectioner William A. Breyer's recipe for ice cream, which limited ingredients to cream, milk, sugar, and vanilla.

Dairy desserts, sundaes, and ice cream sodas continued to mark historic events. To honor U.S. Secretary of State William Henry Seward's purchase of Alaska on March 30, 1867, Charles Ranhofer, a French chef at Delmonico's Restaurant on William Street in Lower Manhattan, invented baked Alaska, a sponge cake dessert topped with ice cream and meringue and broiled to create a hard shell. In 1875, during the reformation of American Judaism, Isaac Mayer Wise shocked orthodox guests by serving nonkosher food—seafood and ice cream to follow meat.

At the Philadelphia Centennial International Exhibition of 1876, the first world's fair in the United States, American visitors viewed a range of culinary advances, including Boston silversmith James Walker Tufts's ice cream arctic soda fountain. With less grandeur, vendors on bicycles or pushing carts targeted children in the North Atlantic states and in England. Italian sellers crying *O, che poco* (Oh, how little [it costs]) confused English speakers, who referred to ice cream as "hokey-pokey." In *Miss Beecher's Domestic Receipt-Book* (1846), Catharine Esther Beecher, forerunner of the home economics movement, declared ice cream a boon to treatment of fevers.

In 1885, English kitchen entrepreneur Agnes Marshall published *Ices Plain and Fancy: The Book of Ices*, followed in 1894 by *Fancy Ices*, both illustrated with line drawings and recipes for bombes, glaces, parfaits, and *tartufos*, balls of ice cream iced in chocolate. Her instant freezing of cream with liquid nitrogen into geometric shapes and miniature monuments astonished diners and produced a rush to buy her name brand of ice cream freezers and molds for ices made from jam and liqueur syrup. Marshall's lace paper doilies and ice cups simplified serving and cleaning dishes of such specialties as *crème panachée*, her version of

an ice cream cake made from ingredients with contrasting colors, flavors, or textures. She also turned ground almonds into the ice cream cone, which she called “cornet à la crème.”

Period recipes specified coconut oil for flavoring ice cream and creamy yellow dyes made from lemon-flavored citral or yellow-orange annatto. In 1912, California horticulturist Luther Burbank hybridized a spineless prickly pear, which yielded pulp for Southwestern ice cream and sorbet. By husking, milling, and gelling guar beans in water, ice cream processors produced a digestible, odorless guar gum that emulsified and suspended solids in ice cream and sherbet to prevent crystal growth and ingredient settling. Ice cream makers also used the gluten found in carrageenan and kelp.

Food producers valued vegetable mucilage for suspending starch in liquid and for ameliorating the effects of freezing and thawing. By 1920, the stability of frozen ice cream made possible chocolate-covered Eskimo Pies and the Good Humor Bar on a stick, which uniformed distributors sold from vans while beguiling neighborhoods with calliope music. Rocky Road, introduced in 1929 in Oakland, California, contained enough viscosity to hold marshmallow and walnut pieces suspended in Edy’s ice cream. In 1934, *Popular Mechanics* magazine proposed that health food makers add cod liver oil to ice cream and milkshakes to halt the effects of malnutrition in poor children.

Rationing in the 1940s limited America’s top novelty food, including Thomas Carvellus’s Carvel frozen custard, sold from a truck in Hartsdale, New York. As wheat supplies dried up during World War II, ice cream vendors improvised a new cone-making flour from crushed, sweetened popcorn. Creameries dispensed Dixie Cups and substituted coconut and cottonseed oil in the mix for rationed butterfat.

Food writer Elizabeth David summarized the style and flair of regional cookery in *Italian Food* (1954), which applauded the taste of Neapolitan and Sicilian ice cream fanciers. Her validation of luxury iced desserts predicted the late-twentieth-century rush toward gourmet ice creams, such as Godiva and Starbucks, which feature greater proportions of chocolate and cream.

Recent Developments

From the early twentieth century, packagers of ready-to-eat foods added potato and rice flour, oat fiber, and soybeans as the standard thickeners that gave sensuous mouthfeel to ice cream. Caramel concentrate, a traditional food dye, offered an intense brown hue to chocolate ice cream. To combine the top flavors in a single product, dairiers invented choc-van-straw, or Neapolitan ice cream, a trio of popular tastes. Apollo astronauts enjoyed Neapolitan ice cream in freeze-dried bricks. By the 1970s, Australia and New Zealand competed with the Northern Hemisphere in marketing dairy desserts. Simultaneously, frozen yogurt, first marketed in Boston in 1978, further restructured the ice cream market.

The Baskin-Robbins and Howard Johnson chains faced competition from Dairy Queen and Tastee Freez, distributors of soft-serve desserts puffed with air. High butterfat content made Ben & Jerry's and Häagen-Dazs premium ice creams more flavorful and spiked sales of Cherry Garcia, Chocolate Chip Cookie Dough, and Super Fudge Chunk, among other flavors.

Despite warnings from the healthy food movement, recipes worldwide—Argentine *helado*, Filipino halo-halo, Hawaiian shaved ice, Italian gelato, Korean *patbingsu*, Malaysian *ais kacang*—retain the original concept of a fruity iced sweet. In the Azores and China, chefs add sugar to pureed taro for ice cream and pie filling. A favorite Arctic dessert, *agutak*, or “Eskimo ice cream,” blends the flavor of whipped fat or tallow with blueberries, cloudberry, cranberry, crowberry, or salmonberry. Raw foodists make sundaes from frozen raw milk and Thai coconut. Globally, ice cream fanciers enjoy more than 1,000 flavors, including apple gingersnap, Christmas ale, cinnamon cocoa, cranberry crisp, and matzoh crunch.

See also: Additives, Food; Guar; Ice; Marshall, Agnes; Taro; Trans Fat.

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Idiocuisine

A current interest of anthropologists and sociologists in idiocuisine reflects agrarian and kitchen conditions and market sources and their influence on traditional family eating habits. Essential to daily sustenance are the ingredients and recipes indigenous to the household and its forebears. From clan preferences grow the true idiocuisine, the foods that families prefer for everyday consumption and for holidays and feasts. In each instance, the exigencies of rationing, conquest, and war threaten the familiar, such as the near extinction of the buffalo and laws against whaling and collecting sea turtle eggs.

The familiarity of idiocuisine forces clan foodways to evolve over time. In frontier days, European newcomers to North America incorporated the New World flavors of avocados, blueberries, buffalo meat, pecans, and persimmons in their heritage recipes. The substitutions of cranberries for English currants in fruit leather, collards for spinach in spanakopita, and corn bread for Italian wheat loaves and French baguettes turned relocation into a culinary challenge. Further skewing established patterns of eating, mixed marriages introduced both members of a culture to considerable adaptation, such as the Indian wife's addition of jerky and pemmican to the white frontiersman's diet and the black homemaker's blend of callaloo and black-eyed peas into the everyday meals of her biracial children.

Historically, diasporas forced compromise into familiar eating styles and acceptance of available commodities. Newcomers ventured from ethnic bruschetta, nan with kebabs, pita pockets, tacos, and wraps to Americanized sandwiches and heroes. During the stress of acculturation, kitchen innovations heightened the positive aspects of life made different by conditions and locale. In major adaptations—such as the replacement of European wild sage honey and beet sugar with molasses and of Turkish dates and figs with dried wild plums—the immigrant's idiocuisine remained in a state of recipe shift and kitchen experimentation.

Refugees and migrants brought pervasive culture change to their new homelands, as did Filipinos in Hawaii, Mexicans in Texas, Nigerians in Canada, Pakistanis in England, Parsis in India, and Portuguese in Mozambique. New Englanders augmented barley-and wheat-based recipes with cornmeal, thus inventing the johnnycake. Similarly, New Orleans Creole cookery found ways of blending the West African okra pod with *filé* (dried sassafras leaves) and of turning French nougat and walnut recipes into pecan-based pralines. While newcomers to the Mississippi River delta fused words and concepts into a New World patois, cooks made similar shifts in their daily coffee by blending it with chicory for a taste indigenous to southern Louisiana.

As gastronomy moved in another direction, toward homogenization—exemplified by British-style curries in India and boxed Italian gnocchi and pasta rather than homemade—regional food gradually lost its idiosyncrasies and became an endangered species. Celebrity chefs advanced idiocuisine into culinary exhibitionism by extending novelties to traditional recipes, an improvisation attuned to showy tour-de-force entrees and snacks, such as stuffed squash blossoms, mango salsa, piki (blue cornmeal) chips, and jalapeño poppers, rather than stable regional specialties.

Fortunately for purists, travelers and academic chefs in the 2000s began shifting pop food culture away from indiscriminate snacking, overprocessed foods, and drivethrough fill-ups toward authentic ingredients and cookery. Adventurers turned to *Bon Appetit*, *Cuisine*, and *Saveur* magazines for data on holistic nourishment at patterned meals, a revolution that restored authenticity to idiocuisine. Patronage of local food markets brought free-range chickens and eggs and artisanal beers, cheese, and sausage into regional use, supplying the home pantry once more with the aromas and flavors of memory.

See also: Fusion Cuisine; Heritage Foods; Local Food Movement; Nouvelle Cuisine; Regional Cuisine.

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Immigrant Diet and Cuisine

An exercise in adaptation, the diet and cookery of immigrants and refugees make immediate shifts away from heritage recipes to the availability of ingredients and cooking techniques in a new locale. Native cuisine arouses fierce loyalties, as with the Italian midday meal of macaroni with oil and the Irish consumption of cabbage, corned beef, and soda bread on St. Patrick's Day. Shoppers maintain centuries-old habits, particularly buying potatoes or rice by the bushel and purchasing peppers and tomatoes several times per week to ensure freshness.

Over time, compromise produced Chinese, Italian, Mexican, Taiwanese, and West Indian foodways that accommodated American and Canadian tastes. Similarly, newcomers from Jamaica, South Africa, and Sri Lanka in England reconfigured dining styles and entrées to suit the colder climate and agricultural produce of Great Britain. To appeal to shoppers, grocery chains began stocking dal and quinoa; specialty shops introduced sashimi and tamales.

When Spanish immigrants settled at Nootka Sound in western Vancouver, British Columbia, in the 1790s, they fertilized gardens with fish offal and seaweed and planted kitchen gardens plus orchards and pastures. Fenced-in vegetable patches produced angelica, artichokes, barley, beets, cabbage, carrots, celery, chickpeas, eggplant, lettuce, onions, parsnips, peppers, potatoes, and rape, all suited to North American rainfall and snowy winters. Spanning the next two centuries, cabbage, potatoes, and turnips remained prominent in local cuisine alongside imported flour, salt beef, sugar, and tea.

Upon reaching Ellis Island, new arrivals to the United States abandoned the limited choices of beans, cabbage, gefilte fish, and peas in their shipboard stashes for free meals from the Department of Immigration. Children indulged for the first time in bread and butter and coffee with milk and sugar, treats that had the power to plump up bony frames. The height of dining hall largesse, the Thanksgiving banquet introduced immigrants to cranberry sauce, sweet potatoes, and turkey. Jubilant women placed celery sprigs in their lapels while children peeled mandarins and savored them section by section.

Cooks established home kitchens, some with open hearths, and spent about 40 percent of family incomes on food, compared with native-born budgets of 33 percent. In ethnic neighborhoods, women tsk-tsked over produce in handcarts. Tenement kitchens echoed with the sounds of cabbage chopping and garlic mashing and the smell of spaetzel grated into boiling stock. House wives proudly shared their expert meatballs and tamales at potluck dinners and parties.

Americanization required adaptation to the new and strange, such as chewing gum and popcorn. For sustenance, Greeks, Italians, and Syrians lived by the lowest nutritional standards, as compared with German Jews and Slavs. At ghetto restaurants, immigrants indulged in cheap fare served by wait staff, the first strangers that newcomers had seen serving meals. Children learned to pass bowls rather than grab from a central platter or pot. The simple act of receiving plated entrées and hot coffee poured into cups rather than mugs conferred dignity and respectability on a people who had fled persecution and serfdom.

Social workers explained the mysteries of the double boiler and introduced such unfamiliar foods as the grapefruit. Home economics classes coaxed girls away from overcooking nutrients out of cabbage and greens. Those immigrants who found jobs in American restaurants and home kitchens gained new perceptions of holiday specialties, such as fruitcake, champagne, and eggnog for Christmas rather than Old World *baba*, *lebkuchen*, and *syllabub*.

The dramatic shift in immigrant diet altered the demographics of disease, primarily dental caries, diabetes, and heart disease. Accustomed to the peasant fare of Cambodia and Vietnam, children of the “boat people” in the 1970s found potato chips and cola drinks more palatable and varied than Old Country snacks. Laotians, who traditionally chopped small portions of meat and added it sparingly to rice dishes, increased the proportion of chicken and beef in their diet,

thereby reducing intake of fish and vegetables. Ethnic mothers suspected school cafeterias of circumventing the female's control of nutrition and of demeaning ethnic meals as inferior.

Female householders who spoke little English or recognized no writing in the standard alphabet made more haphazard grocery choices in gathering the ingredients for shaping German Jewish blintzes and strudel, Chinese dumplings, or Italian cheese-and-tomato *pizzarelli* (fried cakes). Also unsettling to nuclear family solidarity, the interruptions of electronic media in industrialized countries lured children away from the communal table and respect for their elders. Traditional gatherings, such as Muslim enclaves celebrating Ramadan and Eid al-Fitr, increased the likelihood that such ritual foods as nut cookies and samosas (stuffed pastries) continued to hold a place of reverence.

Currently, immigrants contribute to the social fabric by offering diversity primarily in food preferences and gustatory celebrations. Worldwide, the consumption of frankfurters and hamburgers with mustard and relish betokens the spread of German peasant cuisine to fairs and sports events. In Canada, the government endorses unity in citizenship and patriotism and the uniqueness of cultural tradition, a change of pace from the ordinary. Tolerance for differences makes cosmopolitan cities such as Montreal, Quebec, Toronto, and Vancouver havens of ethnic restaurants and dining experiences.

See also: Fusion Cuisine; Idiocuisine; North American Diet and Cuisine; Polynesian Diet and Cuisine; Regional Cuisine; Sicilian Diet and Cuisine.

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[Inca Diet and Cuisine](#)

One of the marvels of Amerindian sustenance, the Inca diet contained an astonishingly varied diet dominated by amaranth, corn, lima beans, peppers, tomatoes, and tubers called “earth nuts.” A nation of master farmers that thrived in the fifteenth and early sixteenth centuries, the Inca introduced seeds and plants from neighboring tribes and accessed raised garden plots with llama paths and stone irrigation canals. A unique field account system relied on a knotted string called a quipu and a nature-based method of weather prediction.

Beginning in 200 B.C.E., a potato-rich cuisine fed 12 million subjects of the largest empire of the Bronze Age, stretching from Pasto, Colombia, down the western coast of South America to Santiago, Chile. A Spanish explorer and historian from Madrid, Pedro Cieza de León, compiled an 8,000-page eyewitness account of Pacific Coast life that introduced Europeans to the Inca diet and cookery. An adventurer from his early teens, he joined expeditions to Colombia, Panama, and the West Indies and discovered that the Inca cultivated 70 separate crops, more species of foods than other parts of the world. The potato became the only Inca staple to reach immediate global popularity.

In 1548, Cieza de León settled at Lima, Peru, and began chronicling New World events from the Gulf of Darien to La Plata. His four-part *Chronicles of Peru*, composed in Latin in the early colonial era, reached print piecemeal, concluding in 1979 with the discovery of a missing section in the Vatican library. In addition to chronologies of the Spanish conquest of Peru and subsequent epidemics that killed 80 percent of the Inca, his text details the consumption of two meals a day, one at sunrise and the second shortly before sunset. Cooks completed preparations in clay pots inserted into holes in the stove. Diners sat or squatted on the ground.

The historian introduced Europeans to salt collection on the Consota River; to Peruvian fauna, particularly the llama; and to native vegetables and cuisine based

on guava, lima and red beans, *oca* (yams), pepper, potato, pumpkin, quinoa, and squash. Cooks served beans in oil and vinegar and flavored grain soups with birds, frogs, larvae, pink peppercorns, snails, or worms. They boiled quinoa kernels into a grain base, similar to rice, and served it with *aji* peppers and leaves and wild bitter herbs. In one startling encounter, the Spaniards killed a giant

Recipe: Azul Potatoes in Spiced Tomatoes

Boil ten *azul* or blue potatoes (*Solanum ajanhuiri*) for 20–30 minutes. Cool, peel, and slice the potatoes and arrange the slices on a platter. Heat ¼ cup vegetable oil. Saute two *aji* peppers, one garlic clove, and one chopped white onion. Add six pureed tomatoes and flavor with pepper and salt, 1 cup of chopped cilantro, and a small bunch of chives or green onions, chopped. Simmer for five minutes and dress the potatoes with the spiced tomato mixture and a sprinkling of vinegar.

snake, discovering in its gut an undigested deer. They retrieved the deer and cooked the venison for dinner.

Staples

In the first volume of his chronicles, Cieza de León observed the harvesting of palm hearts from palm groves and recorded the variety of uses for coconut in the manufacture of cream, lard, milk, and lamp oil. In terraced highland gardens, he cataloged root crops (*camote*, *maca*, *oca*, potato, *ulluco*, and *yuca*), pigs and tapirs, fish, and an abundance of birds and turkeys. The preservation of *ulluco* produced a powdered antidote for stomach ills and labor pains. The sweet potato served as a vegetable for frying, roasting, or stewing or as a fruit cooked into preserves.

By alternately sunning and freezing potatoes over a five-day period and trampling them under foot, farmers dehydrated the tubers into *chuño*, which natives steamed and used to thicken broth. They also dried salt meat into *charqui*,

the original jerky. When llamas ended their service as beasts of burden, cooks sliced their meat into strips for drying and tenderized it by pounding it between stones. Drying promoted a long shelf life in stone silos and ware houses and portability for travel. The Spanish turned chuño to commercial advantage by shipping the freeze-dried potatoes to Potosí, Bolivia, to feed the press gangs who worked the silver mines.

The chronicler continued down the South American coast along the central Andes and described the foodstuffs of the Huari near Lake Titicaca and the predominance of quinoa in pantries at the seaport city of Collao. Along the coast, fish drying provided the Inca military with their main staple. In the Chacama Valley of northwestern Peru, farmers grew sugarcane to make into sugar and conserves.

At Cartagena, the historian observed a wake for the chief. During the ritual, mourners gathered to drink *chicha*, a ritual corn beer flavored with goldberries and fermented in jars buried in the ground. Survivors amassed platters for a feast, jugs of chicha, and women and servants to bury alive with the mummied corpse.

At Puna Island, off the coast of Ecuador, residents fed on birds, corn, and yuca; at Huanca to the southwest, dogs were a delicacy. At Guayaquil and Puna, herbalists treated pestilence with sarsaparilla and a diet of “delicate meats.” The historian ranked the sarsaparilla root as the world’s best and most useful herb and root.

Cieza de León described common foods of Peru as well as temple gardens and the reciprocity by which royalty repaid laborers with elegant feasts in sumptuous plazas. In the Andes, forest-dwelling Quechua sowed corn and gourds, dug root crops, and cultivated orchards of avocado, cocoa, custard apples, eggfruit, *pacay* (ice cream bean), and passion fruit. To extend gardening inland to Cuzco, Indians spread loam from the Andes over barren soil, which, thus enriched, produced two crops of corn and potatoes per year. In addition to vegetables, the Inca of Cuzco chewed coca, an herb that empowered workers even when they were tired, hungry, or suffering pain. In irrigated fields fertilized with guano from the bird islands and sardine heads, they produced ají peppers, corn, cotton, gourds, sweet potatoes, and yucas.

The assembly of citizens for a banquet required no plates or bowls. Diners consumed fruits, roasted meat, and tubers with their hands. At a display of

Peruvian cuisine, the historian marveled at a dinner of roasted llama, which he deemed the best meat he had ever eaten.

Corn and Its Accompaniments

Meticulous corn planting so dominated Peruvian agriculture that the Inca arranged the calendar around the stages of corn sowing, ripening, and harvest. They ate corn roasted, boiled, popped, or ground into meal for dumplings to add to stews or for shaping into dough for tortillas. Corn coordinated well with other foods, including fried guinea pig, nuts, and seafood and seaweed. Runners hurried fresh fish and oysters from the seacoast to the royal kitchen of the emperor, Sayri Túpac. One flavoring, the *pepino*, a striped cucumber, Cieza de León found sweet but indigestible.

Peruvians also domesticated ducks for feathers and meat, which they disjointed and carved with copper knives. They reserved the roasting and stewing of alpaca, fish, guinea pig, and llama meat for special occasions. To protect the people from years of famine, rulers controlled the hunting of wild game and stockpiled up to a seven-year supply of food in store houses, such as the ones the historian viewed in the Xayanca Valley of northwestern Peru. The state guaranteed citizen subsistence by maintaining a network of food distribution to even out shortfalls with surpluses from other regions.

In the second volume, Cieza de León admired the moral integrity of the Inca, who suppressed cannibalistic hunter-gathers and outlawed their “abominable sin” of eating the flesh of sacrificed men and children. During the Inca propitiation of the creator god, worshippers preceded the harvest festival with fasting, abstained from meat and salt, and consumed a 12-day diet of only water and chicha, served during morning hours. Holy virgin brewers fermented the sacred beverage and poured it from silver carafes into gold chalices. Chosen victims drank heartily of chicha before priests strangled and canonized them. The culminating late-morning banquet at Cuzco involved the slaughter of doves, guinea pigs, white llamas, and sheep and the anointing of idols and the portals of temples with animal blood. Augurs read the entrails of the sacrificed animals for portents. At a ritual garden, they erected gold corn stalks among gold dirt clods, replicas of

indigenous vegetable plots.

See also: Amerindian Diet; Peppers; Pit Cookery; Potatoes; Religion and Food; Salt; Trade Routes.

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Indian Diet and Cuisine

Over five millennia, India evolved a cuisine unique in its application of herbs and spices and in taboos surrounding meat consumption. Around 1700 B.C.E., scripture in the Vedas championed balanced combinations of dairy foods, grain, honey, meat, fruit, and vegetables. The Asian concept of the body in balance, derived from China, depicted eating as a form of self-medication, with foods and herbs that cured indigestion, lethargy, and impotence.

Parallel to the carnivorous diet, vegetarianism gained advocates, primarily from Aryan Hindus, who denounced animal butchery and the waste of dairy herds. Hindu jurisprudence criminalized the consumption of animal flesh and replaced meat burning on altars with gifts of milk. In place of animal sacrifice, peasants worshipped at altars with gifts of flowers, fruit, incense, oil, and vegetables. In Jharkhand, the stress on meatless entrées elevated the importance of sweet potatoes, Indian beans, pumpkin, bamboo shoots, chutney, and fruit. In contrast, Kerala developed a vegetable-based diet that allowed fish and poultry, edibles preferred by Christians and Muslims.

By 800 B.C.E., a moral handbook, the Baudhayana Sutra, stressed the ascetics of

portion control from unadorned dishes of barley, dairy products, oil cake, and rice. The Mahabharata (ca. 200 B.C.E.), the Indian epic, further condemned beast butchery and promised vegetarians longevity and a sound memory for their purity of heart. After 320 C.E., the Gupta Empire in northern India introduced a golden age of religion, philosophy, and Ayurvedic medicine, which promoted tea and cooking spices, a bold introduction of appetite stimulants to a bland Indian diet. In the 1400s, Timur's invasion of Kashmir created a fusion cuisine of Indian and Persian elements that featured lamb and rice.

In the 1500s, the Indian renaissance evolved the Mughlai cuisine, a further elevation of taste and aroma in pungent kebabs, meatballs, rice and egg dishes, cardamom-flavored pudding, chili stews, and pilaf (rice simmered in broth). A model, chicken tikka masala, curried chicken in a masala sauce, defined the age. The iconic recipe passed to Bangladesh and Pakistan; British colonials adopted the spicy chicken as representative of colonial Indian cookery. In Pondicherry, French colonials influenced Indian recipes for tandoori potatoes, coconut curry, baked mung beans, and stuffed cabbage. In the Himalayas, the Sikkimese diet featured northwestern grains—millet buckwheat, barley, soybeans, and wheat, a contrast to Bengali entrées of lentils and greens cooked with shad, mullet, catfish, or bass.



Traditional Chettinad cuisine, from a region in southern India, features spicy, aromatic nonvegetarian dishes

such as curry and biryani with chicken, lamb, or fish (no beef or pork). Popular spices include star aniseed, red chilies, tamarind, cardamom, fennel, and cloves. (*India Today Group/ Getty Images*)

Distinctive regional foods exploited local ingredients, including fruit and seafood in Andamanese cuisine and coconut and tamarind in Hyderabad cookery. Telugu cuisine centered table staples on rice and lentils; Assamese specialties favored dried fish and pickled vegetables. Bihar chefs built a local reputation for flatbread, fish with mustard, and dairy buttermilk, ghee, and yogurt. On the coast, Goa cooks sweetened seafood platters with rice steeped in coconut milk, an element of the seafood dishes of Lakshadweep. Manipur localized pantry staples with chili peppers and leafy vegetables from kitchen gardens and domestic fish from ponds.

See also: Chutney; Curry; Dal; Gama, Vasco da; Pit Cookery; Portuguese East India Company; Silk Road; Spices; Vegetarianism.

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Indonesian Diet and Cuisine

Over five major land masses and 6,000 smaller islands, Indonesian menus feature local ingredients and the influence of colonial and commercial domination by

Asians and Europeans. Nature blessed the region with cloves, galangal, and 600 bird species, as well as bananas, rambutan and jackfruit for juices, and coconuts, an all-purpose ingredient. Nutmeg, native to the Banda Islands, developed into one of the world's costliest comestibles. Gourmet peppers—Sumatran *lampong* and *sarawak* from Borneo—heighten the taste sensations of hot, spicy stews.

In New Guinea, Malaysians domesticated sugarcane around 8000 B.C.E. and passed the plant to traders from northern India. After 3000 B.C.E., island hunter-gatherers added wild rice to edibles. Sustenance depended on the addition of chayote, greens, beans, sago palms, breadfruit, and taro. Growers domesticated rice in 2300 B.C.E. The sowing of wheat from China and India produced noodles, steamed buns, and loaves. Along with mustard, ginger, cabbage, and jasmine tea, Indonesian cooks adopted Chinese stir-frying. After 1050 B.C.E., Chinese rice varieties thrived in Malaya as a grain and a stem steamed like bamboo shoots.

Waves of insurgents influenced heritage recipes. Curry, black pepper, lemongrass, shallots, cinnamon candlenut, cumin, cardamom, fennel, coriander, onions, cucumbers, mangos, eggplant, and tamarind came from India in 300 C.E. in exchange for extra-hot long pepper (*Piper longum*), an Indonesian staple that merchants in India passed to buyers in Poland, Russia, and the Ottoman Empire. Simultaneous with Chinese contributions of marbled eggs, garlic, ginger, and scallions and Hindu vegetarianism in the 600s, Arabs introduced yogurt and kebabs during the spread of Islam. After 900, Laos contributed sticky rice, an essential for puddings and desserts.

At the end of the Middle Ages, Muslims imported lamb cookery. The arrival of Portuguese navigators in 1512 revealed to Europe the treasure of the Maluku islands in cubeb, cloves, and nutmeg. By the 1600s, Dutch traders adopted Indonesian grated nutmeg rind for spicing beans, brussels sprouts, cauliflower, cider, turnips, eggnog, pudding, sausage, and wine. From the Dutch, Indonesians experienced their first barbecue, bread and pastries, cheese, and pancakes. Spanish adventurers traded for Indonesian spices with African yams and New World potatoes, cassava, corn, chili peppers, and sweet potatoes. Imported peanuts provided cooking oil and formed the basis of meat sauces and marinades. In European style, Indonesians drank coffee and tea with sugar.

Regional dishes exhibit the creativity of island cooks in combining fresh ingredients, particularly bok choy, yard-long beans, and bean sprouts with rice

and goat meat. The Javanese specialize in beef and noodle soup, rice balls, corn, and shrimp paste. Balinese restaurants feature spiced duck and minced meat on a stick. Sumatrans celebrate events with roast dog, buffalo, or pork boiled in blood and vinegar and served with mung beans, durian sauce, or sago dumplings. A meatier cuisine in Sulawesi, Papua, and the Maluku islands bases meals on poultry, roast boar, and seafood as well as red snapper and tuna. Families center wedding dinners on pork in the style of the Hawaiian luau.

In the twenty-first century, Indonesian restaurants and pushcarts advertise national dishes—fried rice with chili and soy sauce, cucumber and bitter melon salad with peanut sauce, *satay* (skewered goat, beef, or tofu), and mutton or offal *soto* (soup), a national dish. Rice, the basis for innovative gastronomy, absorbs coconut milk and lemon juice and undergirds wine and desserts. Curry spices and indigenous *sambals* (chili-based sauces) enliven vegetable stir-fries. Chinese enclaves and the non-Muslims of Bali, Maluku, and Papua feast on lard-fried carp and grilled pork, which Islamic law forbids.

See also: Lapérouse, Jean François Galaup; National Dishes; Portuguese Diet and Cuisine; Rice; Spices; Vanilla.

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[Industrial Food Processing](#)

The alteration of raw ingredients into marketable food for cooking or serving out of the package involves industrial food processors in intimate nutritional influence on human health. From Neolithic times, hunter-gatherers devoted most

of their waking hours to food security. To extend the shelf life of potential famine supplies, they slaughtered fish and mammals, dried herbs and berries smoked meats, and salted goods, limiting their cuisine to the foodstuffs at hand. To vary their diet, clans had to migrate closer to lakes and seashores and to abundant hunting and foraging grounds.

The evolution of agriculture in Neolithic Syria in 12,000 B.C.E. introduced grain to the diet along with the toil of threshing, milling, stirring porridge, and baking, the rudiments of processing food for storage and distribution. Ready-to-eat meals—Cornish pasty, flatbread, haggis, jerky, pemmican, roasted corn—fed journeymen and soldiers who had no opportunity to build a cookfire. The growth of cities added to the tables of the elite labor-intensive baklava in Istanbul, beer at Ur, sun-dried vegetables in Cairo, *garum* in Rome, *kimchi* at the Korean royal court in Seoul, couscous in Jerusalem, tea in Edo, soba noodles in Tokyo, and coffee in Aden, Yemen.

With urbanization came greater body height and longer life spans, two benefits of enriched processed foods. Offsetting the benefits, slavery and servitude diverted kitchen tasks to the lowest social echelon, the one least likely to enjoy such complex dishes as macaroni, sorbet, and hot chocolate.

Factory Food

The Industrial Revolution and steam engines augmented the choices of pantry items and travel fare that relieved the cook of peeling, chopping, and stirring and the artisan of hand-kneading dough for pasta, grinding corn on a mano and metate (grinding stone), milling wheat on a saddle quern, and pressing olives for oil and grapes for wine. After Nicolas Appert introduced vacuum canning in 1809, cooks superintending mobile kitchens and ships' galleys broke the tedium of meals prepared only from salt pork, dried beans and fruit, biscuit, tea, and flour. Tinned tomatoes and tuna received processing in rural agrarian enclaves and along global shores, increasing jobs for women and the unskilled. By 1818, the British navy became a regular customer of tinned food. In 1824, Ezra Draggett and Thomas Kensett increased canning possibilities in glass, which reduced the potential of lead poisoning from metal cans.

Discoveries and improvements marked the remainder of the 1800s. Gail Borden's production of canned milk in 1856 and the invention of pasteurization in France in 1862 enlarged the pantry even more with stable, safe milk and other dairy products. Tear strips and key winds simplified the opening of canned goods. Grape juice, beer, and liquor processing and ice plants tended to function best near sources of water. Oat milling, which earned higher profits when situated close to grain fields, required warehousing and distribution by wagon and canal boat.

The twentieth century brought food commodification to new heights with tanker-delivered baby food, canned soup, freeze-dried coffee, fruit concentrates, milk, sliced Hawaiian pineapple, and preservatives that kept bread fresh for days. Factory handling of bread and meat made the greatest shift from neighborhood bakeries and butcher shops to anonymous food handlers. Dried foods—bread mix, cereal, milk, rice, instant tea—allowed rescuers to ferry sustenance to areas plagued by epidemic, famine, flood, and siege.

Canned and frozen foods such as green beans and sliced mushrooms came to the table in uniform bites and consistent quality. To boost merchandise appeal, factories developed artificial aromas, colorants, flavorings, sweeteners, and synthetic vitamins that enhanced boxed pudding, citrus fruit, and such bottled toppings as maraschino cherries and walnuts. Additives generated concerns for allergies, which caused serious reactions from monosodium glutamate, nut residue, and red dyes.

Convenience food boosted cuisine to a new era of rapid satisfaction of hunger and a decentralization of meals in family life. In 1951, as the television set began to consume home “together” time, Swanson sold 10 million frozen chicken pot pies in its first year of distribution. The next year brought frozen fish sticks and Birds Eye frozen peas, both marketed to harried moms. The philosophy of “quick and easy” accepted into the modern idiom french fries, Nescafé, Cheez Whiz, Tang, Green Giant, Sweet’N Low, and Butterball Turkey.

Pop-top cans, TV dinners, Reddi-Wip aerosol whipped cream, microwave egg rolls and popcorn, surimi (simulated crab sticks), boiling pouches, pressure extrusion of cereals, and boxed diet meals further aided the working homemaker by shortening preparation time and simplifying cleanup. Internet sales made available exotic herbs and spices as well as vacuum-packed mutton and salmon.

Cost cutting with the use of hydrogenated vegetable oils and high fructose corn syrup caused concern for rising incidence of coronary and vascular disease, diabetes, and obesity. Less publicized alterations, such as the use of pectin to homogenize fruit juice, begged the question of processing for the sake of commerce rather than food for health.

Food Standards

The cleanliness of agroprocessing factories historically generated scandal and class-action suits against careless and dishonest processors, notably, the Chicago meatpackers targeted by Upton Sinclair's exposé *The Jungle* (1906). As the proliferation of highway systems and supermarkets simplified suburban shopping, U.S. scrutiny increased on food handling and distribution with the addition of regulations and frequent inspections, especially of imported prepackaged fish, meats, and tea from Argentina, China, Japan, and New Zealand. In 1949, the U.S. Food and Drug Administration (FDA) initiated government oversight of processed food with a guidebook, "Procedures for the Appraisal of the Toxicity of Chemicals in Food," compiled by Arnold J. Lehman, the "Father of American Toxicology."

In 1963, irradiation first sterilized dried produce to kill vermin and halt sprouting. The following year, the FDA banned sodium cyclamate, a diet sweetener and known carcinogen, originally used in candy and juices formulated for diabetics. In 1976, the banning of Red No. 2 coloring reminded consumers of the many ways that additives impact diet, especially among children. For the remainder of the century, commercial food producers advertised concern for nutrients and fiber in products, the dangers of salt and sugar in baby food, and control of caffeine, cholesterol, fat, and sodium. In 1980, *Food Processing* magazine foresaw a shift in industrial focus on profits to nutrition and accurate labeling. A countermove to limit solid waste in 1991 resulted in tough laws in Germany against overpackaged processed foods.

The twenty-first century turned the tide on ready acceptance of industrialized foods. Although bottled water outsold carbonated drinks, shoppers increased purchases of organic food by 95 percent and launched a campaign against

genetically modified corn in Kraft snack chips, taco shells, and tortillas. In 2000, U.S. meat inspectors applied the Hazard Analysis and Critical Control Point (HACCP) law to meat testing by abandoning sight and smell as criteria in favor of scientific measures of pathogens. The media abetted grassroots efforts to upgrade the global diet by publicizing the investigation and punishment of malfeasance in the food industry.

In September 2008, the sickening of 300,000 Chinese babies on impure milk powder resulted in six deaths and 300 extended hospitalizations. The cause, melamine in the milk powder, caused serious harm to kidneys. For the role of the Sanlu Group in the scandal, two people received death sentences and one life imprisonment, the most serious punishments of negligent food industrialists in modern history.

See also: Biscuit; Canning; Crackers; Curry; Freeze-Drying; Guar; Ice Cream; Ketchup; Liebig, Justus von; Pickling; Pork; Seaweed; Soft Drinks and Juices; Sugar and Sweeteners; Vanilla; Vinegar; Yeast.

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Insects

Cultures differ in their acceptance of entomophagy or insectivory, the consumption of insects for food, which flourishes in 80 percent of the global

population. The eating of some 1,000 varieties of “mini-livestock”—insect eggs, larvae, cicadas, and moths—dates to Paleolithic diets, when hunter-gatherers depended on available staples. History attests to the consumption of termites and weevils in Angola, caterpillars in the Congo, and wild bee pupae in Altamira, Spain, after 30,000 B.C.E.

According to historian Bernardino de Sahagún’s *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1558), a multivolume overview of Aztec life, Montezuma II valued insect eggs, which he imported for feasts at Tenochtitlán. The Aztec prized the *meocuili* (maguey worm), which fed off the agave plant. Cooks fried the larvae to a crisp on comal bakestones or packed them into leaf pouches to roast over embers and serve as condiments.

In 1885, Vincent M. Holt issued *Why Not Eat Insects?*, a monograph proposing the eating of slugs and wireworms as a solution to potential starvation in the British working class. He stressed that insects are clean and palatable because they are particular about their diet. His open-mindedness toward available famine food validated Navajo regard for crickets and grasshoppers and Thai and Chinese consumption of fried scorpions as street food in Bangkok and Beijing. Readers vilified Holt’s menus because the choice of insects as a respite from a meat crisis disturbed Westerners and violated Jewish kosher laws, which characterized insects as *treif* (inedible).

In the twenty-first century, changing attitudes toward arthropods value them as sources of fats, minerals, and protein, a given in Botswana, Cambodia, Colombia, Ghana, Japan, Malawi, Mexico, Mozambique, Papua New Guinea, South Africa, and Zimbabwe. Raised in small confines, agave worms, cockroaches, crickets, silkworms, and termites are naturally renewable, a fact that ensures food security in the Congo and the village of Tulancalco, an insectivore community in Hidalgo, Mexico. Insects reproduce rapidly and make efficient use of food. They exude less methane and nitrous oxide than cattle and require no antibiotics and less growing space to yield nutritious meals. In China and India, farmers raise fish, pigs, and poultry on cost-effective insect diets comprised of houseflies, mealworms, and silkworms.

The experience of insectivores tends to be positive, especially when they prepare insects with additives and cook them alive, such as baby bee appetizers in

Japan. In Quito, Ecuador, diners cook white beetles with pork and vegetables, but eat lemon ants live for their vivid flavor. Mexicans add insects to salsa and marinades and choose aromatic larvae for tucking into tacos. In Mexico City, vendors continue to sell the Aztec insect taco, toasted waterbugs, fried worms, green sauce with ant eggs, mosquito egg patties, and guacamole topped with dry-roasted grasshoppers. Other delicacies range from chinch bugs, red ant and waterbug eggs, and toasted locusts to wasps and larvae served over cactus or turkey cake.

Insects contribute to global biodiversity. In Australia, the witchetty grub and ants are filling, thirst-quenching field food. Sardinians consider the larvae that permeate *casu marzu* (sheep cheese) a delicacy. In the tropics, the economic appeal increases because insects grow larger in humid climates. The Tukanoan Indians of the northwest Amazon receive 26 percent of their protein from a cuisine featuring 20 types of insects. For malnourished children in Laos, crickets, locusts, and wasps increase calcium intake in a population suffering from a high incidence of lactose-intolerance. In southern Africa, growers turn the mopane worm into a cash crop. The markets of Oceania feature insects as pantry staples.

See also: Australian Diet and Cuisine; Coprolites; Curing; Kosher Food; Lapérouse, Jean François Galaup; South American Diet and Cuisine.

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[Inspection and Safety, Food](#)

As interest in world cuisine increases demand for new tastes, scrutiny of global

commodities requires the inspection and testing of domestic and imported foods. Situations range from refrigeration failures at convention facilities and orange juice transport by unsanitary tanker trucks to Chinese flour adulterated with benzoyl peroxide and pork contaminated by swine flu at filthy feeding stations. Voluntary compliance with the European Food Safety Authority and World Health Organization standards attests to the business ethics of companies that process and distribute food, especially during droughts, typhoons, and other climate-related crises. However, noncompliance raises doubts about chemical pollutants in food from Belgium, Bulgaria, and Great Britain; bacterial contamination in goods from Portugal and Russia; and toxic raw ingredients from Finland, New Zealand, and Turkey.

In the United States, mandatory assessments by 15 federal agencies enforce codes stipulating date and coverage of inspection—for example, examination of leafy vegetables by the Animal and Plant Health Inspection Service and lab tests for waterborne microbes overseen by the Environmental Protection Agency. Subsequent to an outbreak of *Escherichia coli* (*E. coli*) in 1993, the labeling of stockyard feed by the National Marine Fisheries Service and slaughtering at meat-processing plants follow the regimen of the Pathogen Reduction and Hazard Analysis and Critical Control Point system. At U.S. military installations, soldiers trained for the U.S. Army Veterinary Corps sample goods procured as field rations, particularly high-risk staples such as raw ground turkey. Overseers of the complex monitoring network ensure that food processors cannot conceal questionable goods in sketchy paper trails or depend on end-stage irradiation to negate a host of possible infractions in sanitation.

The U.S. Department of Agriculture tests soil for heavy metals and follows edibles from planting to harvest. Field sanitarians document the sources of potentially hazardous foods arriving at national borders, enforcing the Federal Meat Inspection Act at abattoirs and maintaining on-site survey of eggs, meat, poultry, and seafood. Examples include discoveries in late April 2011 of clenbuterol, a performance-enhancing drug, in pork from Hunan, China, and ink and wax in noodle dough made in Changsha, China. In Chongqing, China, on September 15, 2011, inspectors found melamine in the milk powder used in chocolate candy, ice cream, and pastry. The criminal adulteration boosted the protein content of watered milk, thus allowing the manufacturer to save money

on dairy ingredients.

Within states, county and city inspectors as well as private-sector auditors at food-processing plants such as Kellogg's and Sara Lee scrutinize environments, ingredients, and work habits. Surprise annual evaluation of cleanliness and food storage in bars and restaurants applies regional codes to dishwashing and ice makers. Agents record observations of bare hands in raw chocolate chip cookie dough, misbranded or unlabeled spaghetti sauce storage containers, and cross-contamination of sinks from mixed use with shrimp and beef liver. Surveillance of the internal workings of machinery affects the operation of bone cutters, bottle washers, homogenizers, meat mincers, and taco-making machines. Inspectors insist on apple and pepper washing with noncarcinogenic citric distillates, undeviating storage temperatures in iced tea dispensers, sterilization of salad prep tables and soup ladles, discarding of outdated pie filling and potato salad, and ridding worker environments of ceiling mold and flying insects.

Tourism depends on the safety of food and drink. During unusually heavy human traffic at British forts, Mexican street fairs, and agricultural shows in Australia, food handlers require a license guaranteeing worker health. Agents take samples of bread dough, peanut butter, pistachios, and raw hamburger for laboratory evaluation of fecal contamination and parasites. The most common risk factor involves inadequate cooling and storage of cold foods, which accounts for 92 percent of infractions.

At the 2008 Olympic Games in China, inspection vans moved quickly to troubled spots and congested food venues to analyze air and water and to monitor contagion among chefs and servers. To inform the public, Chinese authorities issued a media blitz at bus and train stations and on television informing consumers of the dangers of chemical additives that boost company profits, such as sodium nitrite to speed the ripening of vegetables.



A lab technician at the seafood inspection station in Mississippi examines a specimen from the Gulf of Mexico after the Deepwater Horizon oil spill in 2010. The FDA has primary responsibility for U.S. food safety; NOAA oversees fisheries management. (*Patrick Semansky/Associated Press*)

Also in 2008, the U.S. Government Accountability Office demanded greater protection from *E. coli*, salmonella, and food-borne illness by the Food and Drug Administration (FDA). The primary threat arose from the influx of polluted fruits and vegetables from Central America, which consumers can eat unwashed and uncooked. The highway joining Nogales, Mexico, with Arizona carries hundreds of trucks daily bearing tomatoes to northern consumers, who have steadily increased consumption of fresh comestibles. Imports stagger the underfunded FDA, which lacks the inspectors and scientists to ensure the American diet of wholesome food by swabbing meats and baked goods for adulterants and by surveying kitchen ventilators and the cleanliness of salad bars, walk-in coolers, and grocery produce sprayers.

A similar concern for deaths from listeria in 2008 prompted the Canadian Food Inspection Agency to spend an extra \$100 million for agent training and lab technology. Among the faults located in 2011, traces of diarrhetic shellfish poisoning marred the edibility of mussels. In China, the Administration of Quality Supervision, Inspection, and Quarantine issued recalls of foreign goods from Denmark, Japan, New Zealand, and the United States. Rejected supplies failed to comply with local standards of bacteria levels and tainted ingredients, including the thawing and freezing of susceptible pizzas and TV dinners.

See also: Commodity Regulation; Disease, Food-Borne; Fast Food; Halal; Kosher Food; Packaging; Sanitation.

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International Food Aid

Global food gifts to the impoverished and to victims of famine and natural disasters derive input from an array of humanitarian and religious organizations and altruistic individuals and corporations. Food sharing has produced one of the landmarks of civilization. The issue of food justice compels industrialized nations to examine the plight of developing countries and to defend human worth and dignity. The growth of the present altruistic community dates to the founding of

the Red Cross in Switzerland in 1863; the Salvation Army in 1865; Caritas International, a Roman Catholic relief agency, in 1897; and the Red Crescent in 1919, following massive displaced persons and refugee movements after World War I.

In guaranteeing food as a fundamental human right, multilateral response after World War II directed one-third of urgent assistance to Asia and sub-Saharan Africa. The bulk of staples included barley, corn, millet, rice, and sorghum in 85 percent of shipments. The remainder consisted of 8 percent beans and peas, 4 percent vegetable oil, and 3 percent biscuits, canned fish and meat, dried dates, ghee, milk products, salt, sugar, and vitamin and mineral premix. Warehousing in anticipation of need required a preponderance of freeze-dried and dry food in vacuum-packed bars, which lowered shipping weight and simplified distribution of uncooked supplies. Although some foods were unfamiliar to people preferring a cuisine of roots and tubers, short-term supply ensured rehydration and stabilization of nutrients and body weight.

Subsequent emergencies involved CARE in relieving famine in Lima, Peru, in 1970 after an earthquake and the Salvadoran Ecumenical Association in aid to El Salvador during the mass killings and displacement in 1981. In more recent history, the European Union and International Monetary Fund stemmed hunger in Soviet Russia in 1991 and Iraq in 2003, when economic sanctions halted trade. Muslim Hands, an Islamic antipoverty charity, joined world givers in 1993 to stem human misery in the Balkans by shipping food and medicine to war-torn Bosnia. In 2007, the International Fellowship of Christians and Jews sent packets of fish and meat, fruit and juice, grains and vegetables, and sugar to Moscow's poor. More philanthropy involved Egyptian wheat shipments to the Gaza Strip in 2008 and the International Red Cross's aid to flood-deluged North Koreans in mid-August 2011.

The global rescue efforts achieved unity and synchrony in 1960, when U.S. politician George McGovern proposed a consortium of civilian-led food aid programs organized by the United Nations (UN). On a three-year trial basis, the World Food Programme (WFP) coordinated 36 nations in saving refugees and catastrophe survivors from hunger. The governing board resolved to raise nutritional levels among the most vulnerable, including children and the feeble and disabled. The ultimate WFP goal lay in building ongoing food banks and

assisting the poor in controlling their own food security. Facilitators, headquartered in Dubai, established a record of emergency response within 48 hours, a feat that directed media attention to the war on acute and chronic hunger. From 1985 to 2000, global cereal donations rose 25 percent, from 12 million tons (10.9 million metric tons) to 15 million tons (13.6 million metric tons).

Because civil strife, economic stagnation, and looting in sub-Saharan Africa endangered feeding efforts, the region dominated international humanitarian aid from the mid-1970s. In the mid-2000s, the WFP engaged guards in armored vehicles to ensure delivery to the hungry in Chad, Ethiopia, Guinea, Ivory Coast, Kenya, Lebanon, Liberia, Myanmar, Sierra Leone, Somalia, Sudan, and Uganda. In 2004, the WFP, joined by logistical teams from Indonesia and the Chinese Red Cross, delivered food to 1.3 million left helpless after a tsunami struck Aceh, Sumatra.



A UN airlift delivers much-needed food relief during the Angolan civil war in the mid-1990s. Hundreds of thousands of internally displaced Angolans depended on UN food aid for survival. Civil conflict often makes distribution difficult. *(Scott Peterson/Getty Images)*

Although surrounded by peacekeepers, the WFP staff lost 14 employees to snipers over three years in East Africa. To boost local economies, the outreach bought corn and sorghum from regional sources, thus reducing both effort and risk by shortening the distance from ware houses to feeding camps and aid stations. Distributors prevented theft by administering “wet feedings,” the dispersal of cooked porridge rather than raw grain. Agents furthered aid to the vulnerable by funding rural work-for-food programs, school lunches, and take-home packets, an incentive for parents to seek education for their children, particularly girls.

In August 2011, with food crises extending from northeast Africa to Swaziland, the World Bank committed to a \$500 million donation. The WFP dispatched 900 tons (816 metric tons) of energy biscuits to Ethiopians and Somali fleeing an East African famine on the Kenyan border, where 2.4 million received meals. Amid fragile refugees beset by drought, hunger, and guerrilla sabotage, airlifts to Mogadishu pushed through al-Qaeda and al-Shabaab forces to reach victims, 80 percent of whom were female. Aid workers joined agents from UNICEF (the United Nations Children’s Fund) and the UN Food and Agriculture Organization to halt a daily death rate on the Horn of Africa of 13 out of 10,000 children under age five.

A tumble in world economies and food hoarding in Russia and Vietnam diminished the stock of dried milk, corn, wheat, and rice that donations could buy. Oxfam, a British humanitarian organization, predicted that food insecurity would hamper the rescue of East Africans into 2050.

See also: Airlifts, Food; Famine; Famine Relief; Malnutrition.

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Irrigation

The artificial watering of soil and vegetation increases the success of dryland farming in areas incurring inadequate rainfall and humidity. A regular distribution of water prevents soil compaction, suppresses dust, and rinses fields free of debris and accumulated salts. Efficient water diversion from bores and rivers in Australia, for example, feeds the nation and provides cereal grain, fruit juice, meat, milk, nuts, sugar, and wine for profitable exports. By contrast, according to hydrologists, too little irrigation and overcultivation of fragile drylands result in desertification, the cause of declining grain fields and famine north of Africa's Sahel and in pastoral Chile and India.

Historically, balanced water systems have advanced civilization. From 3100 to 539 B.C.E., Mesopotamians developed sophisticated catchments and surface watercourses through fertile wheat fields and date palm orchards. Simultaneously, Peruvian Indians of the Andes Mountains terraced land to dam snowmelt and directed it through canals to pepper and potato fields. Similar methods distributed rainfall to agriculture and pasturage in China, Harappan India, and Syria. Southeast Asians watered rice paddies with a "walking pump" (treadle system), a labor-intensive method. Argentines preferred a furrow system, which regulated flow through shallow channels.

Concentrated irrigation efforts have also raised nutritional standards. After 1800 B.C.E., Egyptian growers relied on the oasis at Faiyum to preserve Nile floodwaters for borderstrip watering, a system similar to beans, corn, and squash farming by the Anasazi, the ancient Pueblo Indians of North America's Great Basin. By 600 B.C.E., Armenia and Egypt supported viticulture (the cultivation of grapes) with irrigation canals. Engineering advances around 500 B.C.E. brought the *shaduf* (dip bucket) in use in Egypt, the *noria* (water wheel) in North Africa, and hydraulic engineering in China. In Sri Lanka in 300 B.C.E., the Sinhalese initiated

water storage in a hammered granite tank and invented the valve pit, a sluice network regulated by a dam and 25-mile (40-kilometer) canal.

In the next century, Roman *latifundia* (plantations) distributed to vineyards and orchards rainwater stored in cisterns or supplies pumped from aqueducts, springs, and wells. Roman methods of hydrology increased food production throughout the empire, particularly in Iberia and Tunisia. Advanced hydrology relieved the Romans of complete dependence on Egyptian grain, a source of chronic international military and diplomatic crises.

Engineers focused technology on the best use of labor and water. In 100 C.E., ox-powered chain pumps in China rotated circular discs in tubes to maneuver water to higher levels for watering palace gardens and vegetable plots. In medieval Iberia, the *huertas* (irrigated districts) of Murcia and Valencia codified laws to stabilize water use and prevent conflict. As the consumption of meat replaced the former cereal-dominant diet, Korean scientist Jang Yeong-sil's invention of the rain gauge and water gauge in 1441 enabled farmers to compute the best allotment of stored water by erecting a calibrated stone column in the reservoir.

The exacting dispersal of supplies enabled orchardists to grow citrus fruit in Israel and vintners to establish grapes in California's Napa and San Joaquin valleys and Australia's Murray-Darling basin. By 2000, irrigation reached a height in northern India and Pakistan and furthered crop growing and animal husbandry with networks covering 68 percent of Asian farmland, 17 percent in North America, and 9 percent in Europe.

In an era when food growers compete with cities and industry for water, the efficiency of motor-driven pumps in China, India, Libya, Oman, and the central and southwestern United States threatens watersheds by removing enough water to destroy aquifers. Aquifer subsidence compresses clay and silt, causing permanent loss of groundwater recharge, a situation in the Ogallala Aquifer that plagues northern Texas. Over a decade in Tamil Nadu, India, extraction of groundwater from collector wells dropped the water table by 98 feet (30 meters). In China and Pakistan, inadequate drainage and waterlogging upped salinity 20 percent on irrigated acreage.

Growers and livestock managers support fields and pasture with more efficient drip lines, trickle streams, pivoting or rotary sprayers, and computerized pressure

or rolling sprinklers, which avoid waste from evaporation and misdirected flow. The combination of in-ground microirrigation with plastic mulch, desalinated water and wastewater distribution, and liquid fertilizers formulates equitable use of strapped water systems. In Burkina Faso, Kenya, and Sudan, the harvesting of runoff for irrigating corn, peanuts, sorghum, and yams in a subsequent season triples yields. The direction of water from three lakes and 13 rivers in Malawi intensifies cropping, resulting in a tomato yield to support a local cannery. More complex subirrigation lifts seepage to the top of the water table or to the surface of high-tech green houses, such as Tokyo's seasonless growing complex.

See also: African Food Trade; Agriculture; Aquaponics; Plant Disease and Prevention; Water.

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Israeli Diet and Cuisine

A Jewish fusion cuisine, Israel's diet coordinates Middle Eastern staples with Ashkenazic, Mizrahi, and Sephardic kosher traditions. Heritage foods from the early Israelite culture in 1200 B.C.E. centered on barley bread and dairy items from goats and sheep to accompany dates and figs, beet greens, whole fish and spit-roasted game, olives and olive oil, and honeyed or acetic wine. From Constantinople's Topkapi Palace and the table of Suleiman the Magnificent from

1520 to 1566, Ottoman influence introduced baklava, butter cookies, and bulgur pilaf, a Jerusalem specialty made with long-grain rice. Ordinary Turks fed on more mundane dishes—crusted gratins and stuffed vegetables and pastries.

More than any other socioeconomic element, Israeli cuisine made the most change over time yet maintained kosher taboos. By the 1870s, Jerusalem supported a lively public food market. Modernization altered domestic tradition in 1875 with Berman's Bakery, Palestine's first which a Lithuanian couple from Reisen, Kreshe Berman and Todrus HaLevi Berman, opened in Jerusalem's Old City. While Todrus studied scripture, Kreshe enhanced her kitchen business by selling Christmas honey cakes and black bread to Christian pilgrims.

In 1881, influxes of Polish and Russian Jews brought recipes for artichokes, chickpeas, eggplant, pepper, and zucchini. The Bermans and their sons, Eliyahu and Yehoshua, contributed to home baking needs in 1886 by opening a flour mill. In 1934, the nation received its first homemade ale from the Palestine Brewery, which was built with French backing.

Rituals specified either fasting for Yom Kippur or individual foods for holidays—apples, radishes, fava beans and spinach, almonds, cherry compote, and cheese blintzes or cheesecake for Shavuot and herbs and meat dumplings with challah and knot pastries on Rosh Hashanah. On Tisha B'av, eggs and lentils represented mourning. Couscous preceding honey and fruit turnovers with wine symbolized Purim. At the height of the year, bitter herbs and horse radish, sponge cake, macarons, and unleavened bread captured the themes of Passover seders. Hanukkah called for sour cream on latkes (potato pancakes) and jelly doughnuts. Medieval refinements added gingerbread, lentil pancakes, ragout, salads, and tarts. To prevent work on the Sabbath, beef, fish, and poultry slow-cooked the night before with barley, beans, and potatoes.

The birth of a Jewish state on May 14, 1948, nationalized a people and their myriad cultures from the Balkans, central Europe, Iberia, India, North Africa, North America, and Russia. As 1 million transients and Holocaust survivors crowded into Israel over the next decade, rationing required clever masking and simulation, notably, *ptitim* (toasted pasta) in place of rice, at the request of Prime Minister David Ben-Gurion, and turkey kebabs and schnitzel to replace lamb and veal. For Israel Independence Day, mallow leaves commemorate the siege of Jerusalem, when citizens picked *hubeza* (mallow) in the fields as makeshift

greens. By 1958, the nation began patronizing its first supermarket.

Over the decades, foreign influences have permeated Israeli traditions. Immigrant adaptations have featured identifiable contributions to the national cuisine:



Falafel—mashed chickpea balls deep-fried and served in a pita pocket with chopped salad or pickled vegetables and tahini (sesame) sauce—is iconic Israeli street fare and popular throughout the Middle East.
(Larry Crowe/ Associated Press)

Heritage	Dishes
Algerian	argan nuts and oil; plums
Arabic	fried falafel balls with sour pickles; halvah; meatballs
Austrian	Wiener schnitzel with parsley potatoes; sugar cake; strudel
Bulgarian	brined <i>quark</i> , (white cheese); cucumber soup
Central Asian	chopped seedless cucumber and plum tomatoes in vinegar; halvah pastries
Czech	barley beer; coffee, cake.
Dutch	pickled herring with onion; corn; butter cookies
Ethiopian	pancake bread
Georgian	nut candy; phyllo pastry; vegetable stew
German	sauerbraten; kugel; cabbage soup

Greek	<i>galakto</i> pastry; mackerel cooked in tomato and onion sauce
Hungarian	paprika dishes; sweetened curd cheese
Indian	mango pickles; dal and rice; fried bananas
Iranian	chickpea dumplings; omelets; chicken with pomegranate
Iraqi	laffa bread; crisp rice; cardamom cookies; turnips with date honey
Kurdish	semolina dumplings in soup; date cookies
Lebanese	<i>baba ghanomh</i> (mashed eggplant with tahini); dry-rubbed grilled lamb
Moroccan	couscous; dolma; fried cauliflower; tagines; tomatoes and pepper in garlic and chili pepper
Polish	noodles; <i>rnatzoh ball soup</i> ; bagels
Portuguese	tzimmes (cooked vegetables and raisins); raisin syrup
Romanian	<i>ikra</i> (carp roe) with oil; calf's foot jelly with boiled eggs and mustard cream
Russian	borscht; gefilte fish; dark bread; vodka
Salonikan	<i>borek</i> (fried pastries); white bean soup; whole carp
Slovak	<i>bryndza</i> cheese; pierogi
Spanish	flounder fried in olive oil; semolina cake; puff pastry
Syrian	red lentils with bulgur
Transylvanian	green bean soup; cheese dumplings
Tunisian	liver and spinach sausage; offal in tomato paste; tuna and potato sandwich
Turkish	red pepper relish; hummus with pita; <i>leben</i> (sour cream); wheat berry pudding
Ukrainian	bagels; <i>babkas</i> (yeast cakes) with sweet filling
Yemenite	marrow soup; grilled meat with pita bread; falafel

[Recipe: Israeli Salad](#)

Dice six Roma tomatoes, six pickling cucumbers, one yellow bell pepper, and one red onion. Coat this mixture with a whisked dressing made of 6

tablespoons of olive oil, 4 tablespoons of lemon juice, 2 tablespoons of chopped parsley, 1 tablespoon each of chopped dill and mint, and pepper and sea salt to taste.

Israeli farmers, meanwhile, developed coastal agrarianism to grow and export apricots, avocados, Jaffa oranges, loquats, and prickly pear. Kibbutzim supplied the key herbs—cumin and *zaatar*, an herbal mix with sesame and salt—and the basics of a vegetarian diet, such as soy schnitzel with mushroom gravy and orange and almond pilaf. From citrus groves near the Mediterranean shore to pomegranates and figs of the uplands and cherries and grapes of the Golan Heights, the subtropics of the Sea of Galilee rounded out the fruit fare with bananas, kiwis, and mangoes.

Bolstered on cottage or labneh cheese and eggs for breakfast and a heavy lunch, diners choose *mezes* with tahini (sesame paste) dip or the “kibbutz dinner,” a light spread of cheese and yogurt, vegetables with sour cream, eggs and olives, smoked herring and bread, and orange juice or coffee. Schoolchildren snack on chicken noodle soup and hummus on pita with fresh fruit desserts and drinks. For fast food, many snackers rely on falafel, or fried chickpea croquettes, a national craze typically eaten in a pita pocket with raw or pickled vegetables and a tahini sauce. To please American and European tourists, cosmopolitan restaurants feature a unique haute cuisine served with Israeli salads and local wines.

See also: Caravans; Crusaders’ Diet and Cuisine; Kosher Food; Monoculture; Olives and Olive Oil.

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Italian Diet and Cuisine

A source of dining pleasure worldwide, Italian food demonstrates the innovations possible from a variety of fresh ingredients prepared simply. Italy's cooks have given the world Parma ham, Reggiano cheese, olive oil, balsamic vinegar, gelato, and regional olive oil. Since Roman times, surrounded by stable diets in Greece, Crete, Sicily, and the Levant, Italy has incorporated whole grains, lemons, almonds, grilled fish, and legumes into a healthful cuisine. The Roman preference for barley bread, greens, and pulses undergirded rural foodways that valued fresh vegetables and risotto balanced with capers, eggs, polenta, pasta, tuna, anchovies, peaches, pecorino cheese with basil, and *panna cotta* (milk custard).



An Italian chef prepares *linguine pomodori e melanzane* (narrow, flat pasta with tomato sauce and eggplant). Pasta, tomatoes, and olive oil define central and southern Italian cooking; pasta comes in literally hundreds

of varieties. (Bloomberg/Getty Images)

Peasant cooks established the family table with platters of eggplant, crusty loaves, broiled calamari and fish, and pitchers of red wine preceding *macedonia di frutta* (fruit salad). Antipasti trays showcased salami, *gamberoni* (jumbo shrimp), artichokes, and carpaccio, aged beef sliced thin. Children and adults ate slowly, valuing the time for sociability and enjoyment of aromas and textures of white bean soup, grilled lamb, steamed mussels, and marinated peppers. Food processors enhanced the appeal of Italian produce by packaging unusual pasta shapes, bottling pears and peppers, and preserving lemons in salt.

In the Renaissance, regional Italian fare reached a height of table appeal. In the Piedmont, frittatas (omelets) and truffles vied with pesto sauce, fish and mussel soup, grilled radicchio, sardines, osso buco (veal bone), and *fonduta* (melted cheese) for popularity. Desserts ranged from *torrone* (nougat) in Cremona to holiday *panettone* (fruitcake) in Milan. Down the Apennines, Umbrian suckling pig, Florentine lasagna and minestrone, and Marche dried cod exhibited the variety and flexibility of central Italian menus. To the south, Campanians developed mozzarella from buffalo's milk, and Apulia offered stuffed cuttlefish, oysters Tarantino, and herbed goat and lamb.

After World War II, a host of cookbooks presented to the world the precepts of the Mediterranean diet, a collection of robust recipes for chicken cacciatore, veal scaloppine, gnocchi with pancetta (dumplings and bacon), and fig and port wine sauce over pork. Glossaries differentiated between bolognese (meat) and carbonara (egg and cheese) sauce and *grissini* (breadsticks) and focaccia (yeast bread). Coffee shops added cappuccino and espresso with amaretto to beverage lists. Alerts to exploitations of national standards exposed the American creation of pseudo-Italian pepperoni pizza, buttered *crostini*, and fettuccini Alfredo, a cream-and-cheese diet buster.

In the 2000s, to prevent high cholesterol and cardiac disease, nutritional reexamination of healthful foodways extolled Italian cuisine for stressing small portions and avoiding cola drinks and between-meal snacks. Cooking classes instructed chefs on boiling pasta *al dente* (firm), preparing herbed bread, limiting alcohol consumption, and lessening the amount of meat and seafood in main courses. Nutritionists reintroduced diners to pasta primavera (a vegetarian pasta

dish),

[Recipe: Amalfi Citrus-Tomato Pizza](#)

Slice three plum tomatoes thinly and drain on paper towels. On an unbaked pizza crust, spread the slices evenly. Top with the zest from two lemons. In a food processor, crumble 4 ounces of mozzarella with one stalk of fresh thyme and two stalks of basil. Sprinkle the cheese and herbs on top of the pizza. Bake for ten minutes at 450 degrees Fahrenheit. Serve with lemon wedges.

ricotta desserts, bread salad with tomatoes and cucumbers, and noodles with beans, a satisfying Tuscan main dish more healthful than Americanized spaghetti and meatballs.

See also: Fish and Fishing; Médici, Catherine de'; Mediterranean Diet and Cuisine; Olives and Olive Oil; Pasta; Roman Diet and Cuisine, Ancient.

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J

Jacobean Diet and Cuisine

During the rule of James I of England, who was simultaneously James VI of Scotland, the king pleased himself at table while fighting threats to human well-being and longevity. When he came to power in England in 1603—the beginning of the Jacobean era, which lasted until his death in 1625—the typical upscale Briton lived to age 35. Peasants survived only 25 years on average, in part because of high infant mortality, bouts of scurvy, and epidemics of plague and typhus. Food shortages worsened chances for a long, healthy life, as did coshering, the paying of landlords in food-rents of cattle and grain.

In this era, playwright William Shakespeare dramatized the discriminate palate of Jacobean England. As images of distaste, he called to mind dry biscuit and stale cheese and criticized overdone roast and greasy entrées, the fault of lax kitchen staff. He fancied mustard, nutmeg, pepper, and saffron as well as sauces to complement and enhance flavors, such as the raisin-laced warden pie the shepherds anticipate in *The Winter's Tale* (1610–1611) to celebrate the annual sheep shearing.

As indicated by the witches' brew in *Macbeth* (ca. 1603–1606) and the title figure's hallucination before dinner guests, the English audience viewed Scotland as an exotic, menacing locale. Lady Macbeth's reference to breast feeding and slaying her infant alludes to suspicions of Scots and their barbarity. The discussion of regicide while King Duncan is at supper and Lady Macbeth's choice of an evening posset (spiced milk punch) for drugging guards implies a Scots contempt for hospitality and outright scorn for the divine right of kings.

Agricultural failures and a burgeoning population kept the isolated poor in Cumbria south of Hadrian's Wall on the edge of famine, a topic in Shakespeare's *Coriolanus* (ca. 1605–1609) and *Pericles* (ca. 1606–1608). In the latter, court gluttony among the degenerate of Tarsus contrasts with pervasive starvation among the humble, a motif that returns in *Timon of Athens* (ca. 1606–1608). The

English table fare of aristocrats favored beef and game with white bread, while relegating salt cod, boiled vegetables, and coarse oat or rye bread to the lower classes. Fruit reached the tables of the wealthy in pastry, syrup, and tarts. Meanwhile, the poorest Britons simmered vegetables into a mush thickened with grain. Scarcity increased food crimes and pantry thefts as well as infanticide.

The King's Table

In a golden era of cuisine, James I deepened social disparities and economic strain through extravagance. He employed a French cook for himself and kept four Stuart house holds, his own and those of Queen Anne, Prince Henry, and Prince Charles. The total food expenditures rose to £80,000 annually.

Earls gladly wore the king's livery while slicing meat for his table. James's staff made a show of seating him at a carved armchair and of removing crystal decanters and silver from lavish cupboards. The display of platters on buffets and sideboards exhibited entrées as visual treats. Heavy framed mirrors lit by ensconced candles doubled the show.

During James's 23-year reign, the palace pantry stocked exotic trade goods, from Middle Eastern dates and olives to almonds, ginger, pepper, and sugar, and the royal diner enjoyed baked eel, boar brawn (jellied loaf), liver pudding, mince pie, and poached salmon. Roast goose, a holiday favorite, was featured in the Yule season from November 1 to Twelfth Night on January 6. In 1616, the king urged landowners to honor the season by remaining at their manors over Christmas to dispense food and drink to their tenants.

In Scots style, James refused pork in favor of game. His courtiers and hangers-on dodged obligatory meatless Wednesdays, Fridays, and Saturdays by dropping coins in the charity box to pay for exemptions.

During a state dinner at the Merchant Taylors' hall in London on July 16, 1607, James I feasted in a separate room on special dishes and imported fruit. Safe from the boorish or potential assassins, he and Prince Henry observed through a window the Lord Mayor and aldermen in scarlet robes and the after-dinner entertainment written by Ben Jonson, the court dramatist.

Typically, after a meat course and its complement, the poultry course, the

court retired to a less formal locale, such as a privy chamber or gazebo, to enjoy sweetmeats. Favorites of the era ranged from marchpane (sugar and almond desserts) and sweet biscuits to light suckets (preserved fruit) and fresh fruit. A sugar sculpture set the tone of the last course, which wait staff served on thin dessert plates. Dances and masques rounded out the evening.

James's lack of information about silkworms caused him to order the planting of 10,000 mulberry trees on 4 acres (1.6 hectares). Although the worms refused the leaves, jam makers turned mulberries to profit. Such condiments followed homesteaders to the New World and brightened the unvarying meals of the Plymouth and Virginia settlers.

Setting an Example

The king took exception to drunkenness and depravity and to the fad of tobacco consumption as both a drug and a recreation replacing the dessert course of a banquet. The growing of tobacco had begun in England after 1573, when privateer Francis Drake brought seed from the Americas. Sir Walter Raleigh promoted the fad of smoking and snuff. Doctors claimed the leaves cured cancer, gonorrhoea, halitosis, intestinal parasites, tetanus, and toothache. One treatment for asthma and cough involved powdering the leaves with chamomile, coltsfoot, lavender, rosemary, thyme, and wood betony for ingestion. Farmers also valued tobacco as a sheep dip and pesticide.

In 1604, James I issued *A Counterblaste to Tobacco*, a treatise denouncing smokers and tobacconists. He rejected the notion that tobacco's "stinking suffumigation" protected Native Americans from plague. Rather than adopt the barbarous pagan practices of taking snuff and spitting phlegm, he advocated a holistic "physic" (cathartic) that balanced the anatomical humors, a prevailing concept of wellness in his day. The pamphlet added to the king's tirade a castigation of drunkards for "their swinelike diet," which tended to shorten life, and of diners who sullied the atmosphere at table by lighting up a malodorous weed to "infect the aire." To stem pollutants, James I increased taxes from tuppence per pound to 6 shillings and 10 pence.

The king attempted to standardize medicinal dosages in April 1618 by issuing

the *Pharmacopoeia Londinensis*. In support of the Society of Apothecaries, the text prescribed the dispensing of spices and chemicals. The decree represented a larger program of regulating foreign and home commerce in corn, pepper, and other edible commodities in standard measures and weights.

See also: Cookbooks; Grilling; Honey; Pastry.

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Japanese Diet and Cuisine

The focus of Japanese gastronomy harmonizes rice and tofu with small amounts of fish, meat, and vegetables for a healthful diet that controls coronary disease and obesity and lengthens life. Cooks arrange dishes on small bowls and plates for eye appeal to encourage consumption of fat-free broth and fruit, which produce a meal that is some 800 calories lower than the standard Western diet. The average Japanese diner eats little dairy food or spice but consumes six times more rice than Americans, a daily allotment that includes every meal.

Ancient Fare

From 14,000 B.C.E., Japanese hunter-gatherers collected acorns and chestnuts and

prized the foxnut, the seedpod of a water lily. As agrarianism altered food interests, protofarmers in 4000 B.C.E. cultivated buckwheat. In Hokkaido, Japan, the Ainu abandoned raw food in preference for roasted and skewered pieces of badger, fox, salmon, sea anemones, and wolf. From pounded ubayuri lily bulbs, they shaped flat dumplings, a prototype of the soba, somen, and udon noodle.

By the Iron Age and the invention of heat-proof, leak-proof cookware, filling winter miso soups softened rootstock of carrot, *gobo* (burdock), and leeks. In Hokkaido, processors boiled *kombu*, nori, and *wakame* in iron kettles filled with fresh water before drying fronds on bamboo racks. After nighttime ocean forays by lantern light for cuttlefish and squid, fishing families dried the meat for barter or sale.

After 400 B.C.E., Japanese growers planted taro tubers in paddies as a pantry staple. The vegetable anchored the diet until Asian immigrants initiated the cultivation of short-grain rice in terraced paddies in the late Jomon period (ca. 300 B.C.E.), establishing Japan's culinary identity. Rice contributed to a rapid population spurt. In addition to supplying the family table with a staple cereal and the makings of filled rice balls and fried rice, homemakers introduced rice *congee* (gruel) to infants before advancing to adult foods—bonito flakes, miso (soy paste), and sea tangle (kelp), a food high in minerals.

Before 200 B.C.E., the fermentation of rice with kojii yeast yielded a holy drink, sake (or saki), a religious gift to the *kami* (nature gods) and cultural token of hospitality. Sake makers supplied the imperial household, monasteries, and Shinto temples and shrines. Diners anticipated the *shikisankon*, a series of nine rounds of sake poured into thimble-sized cups and raised them in toasts to guests. At weddings, the couple sipped sake as symbols of the home.

From Meat Dishes to Vegetarianism

In the first century C.E., island herders bred oxen and brought Wagyu cattle from the Korean Peninsula to supply marbled beef alongside venison and wild boar. Cooks sliced meat into thin bites for addition to stir-fried vegetables and soups. Monastery and temple cooks may have been the original distributors of bean curd, the prime source of protein in Japanese cuisine. Around 500 C.E., Buddhist

monks at Mount Koya perfected a process of drying fresh *koya-dofu* (soy tofu), a protein-rich curd formed of cooked soybeans and bittern extracted from sea salt. The progressive censure of butchers and meats resulted in the first antimeat edict in 675, when the Emperor Temmu forbade the consumption of cattle, dogs, horses, poultry, and simians. Only pond fish, whale meat, and wild birds survived as menu items.

After the 600s, the Japanese grocer acquired imported stocks of Chinese cotton, pepper, sesame, wheat, and yellow beans. The introduction of tea offered both a refreshing stimulant and an altar gift for reverencing ancestors. Around 710 C.E., tofu makers developed industrial processing. The acceptance of tofu coincided with the Zen Buddhist vegetarian diet, which banned the meat of horses and oxen and encouraged seasonal produce and nonmeat grills, kebabs, and soups.

During the Nara era of the eighth century C.E., the Japanese cultivated their national staple, rice, along with barley, beans, millet, and sorghum. Vinegar makers widened their niche of the grocery market by supplying samurai with a daily drink. Cooks popularized soured rice wine as a standard table flavoring. Meatless meals waned in daily observance. Under the Emperor Daigo, the consumption of seven-grass rice gruel began in Kyoto in the early 900s, when table settings added spoons to chopsticks. Servers dished up soft-boiled rice blended with daikon radish, shepherd's purse, turnip, and wild celery. Wild celery remained a winter staple and a traditional delicacy on New Year's Eve.

In about 1100, during five centuries of isolationism from imported foods, the Japanese domesticated quail as a source of attractive entrées and tiny eggs that developed into a luxury finger food available at street stalls. The Japanese tea cult in 1190 took hold of customs and enforced coded courtesies and refinements as a civilizing agent. To draw noble Heian theatergoers from Kabuki and Noh performances, gourmet vendors opened hors d'oeuvre shops and sold baby bees and *yakitori* (chicken, beef, or seafood kebabs).

Housing styles reflected the importance of food storage to the average family. In the miso room, an unheated outer closet, farm wives protected dried sardines and shiitake mushrooms in lidded hampers, flour in stoppered bamboo cylinders, and tofu in conical baskets. They fermented pickles and soy sauce, a slurry of wheat, soybeans, rice yeast, and salt cured in flat-bottomed wood barrels. For thickening broth and ladling into noodle broth or stew, they blended condiments

from barley, rice yeast, salt, and soybeans.

From the 1300s, the typical Kyushu house wife prepared meals at a stove in a dirt-floored lean-to. The *ko-tatsu*, a wood frame over a sunken floor hearth, enabled cooks to keep dishes warm. Families crouched at the edge and warmed their feet on the cook pot filled with charcoal. A quilt covering frame and hearth kept feet snug and tea at drinking temperature.



A Japanese sushi chef shapes oblong mounds of vinegary rice (*shari*), topped with slices of salmon, tuna, and other seafood to create *nigirizushi*. Some are bound with narrow strips of seaweed (*nori*). (Shizuo Kambayashi/Associated Press)

In contrast to peasant cuisine, aristocrats, shoguns, and high-ranking samurai during the Kamakura era consumed delicacies on banquet tables as evidence of privilege. Ceremonial snacks of fruits and vegetables shaped like flowers or geometric designs appealed to the eye. Between sake rounds, guests celebrated prosperity by nibbling abalone, dried chestnuts or squid, pickled apricots, and

seaweed. The gathering ended with baroque food service of thick tea and confections consisting of chestnuts, *mochi* (rice cakes), and yams.

Shifting Tastes

During the Renaissance, food writers summarized innovations, including the baking of hard crackers as a naval staple, the steeping of turmeric tea, and the special drying of the abalone catch for home dining. Around 1550, Portuguese Jesuits introduced tempura, or batter-fried shrimp and vegetables. In the late 1500s, as a complement to tea drinking, dried tofu accompanied the beverage service. Advanced tofu menus featured curds topped with chili sauce, dried shrimp, onion, or soy for breakfast. For healing, Japanese prowled open-air markets in search of curative bee larvae and honey. For celebrating, they claimed a Persian liquor, *shochu*, a barley drink containing 25 percent alcohol.

In the early 1600s, Dutch and Portuguese trading vessels penetrated Dejima, a port in southern Japan, bringing corn from Peru, curry and sugar from India, and spices from Malaysia. Aquaculture elevated seaweed from shore wild food of ten species into a coastal industry of 21 strains of algae, which form 10 percent of the Japanese diet. The cultivation of nori (*Prophyra bangiaceae*), a red algae, occurred by accident in the early 1600s in Shinagawa outside Tokyo, where the shogun Ieyasu Tokugawa discovered seaweed growing on the fence around his fish farm. Cooks used seaweed to encircle and preserve sushi, flavor noodles and tempura, and texturize soup.

At Edo, the capital of Japan, imperial chefs in the mid-seventeenth century served meals firepot style with cups of mirin, a sweet sake that suppressed fishy odors. Called “Genghis Khan cuisine” for its Mongol origins, *shabu-shabu*, the individual simmering of thin slices of meat, seafood, and vegetables in hot broth, revived the peasant concept of sitting at a round table and consuming fresh food in a convivial atmosphere.

During the eighteenth century, while rural folk continued pounding rice in mortar and pestle, monks collected recipes in cookbooks to promote vegetarianism. Ornate food preparation promoted urban kitchen artistry with the sweet potato, a new arrival. Espaliering gave outlets to dwarfing specialists who

engineered miniature fruit orchards. Japanese soyfood makers abandoned the coarser Chinese recipes to create soft, white curd cheese prized for its delicacy. The first soy curd cookbook, *Book of Tofu* (1782), cataloged 230 dishes.

Late-nineteenth-century technology generated a demand for milled grain and rice powder, an ingredient in cake and noodles. By 1900, the Japanese were harvesting enough sea vegetables from their 18,000-mile (29,000-kilometer) coastline to generate a \$2 million industry. To make the fronds appeal to food shoppers, Hokkaido processors boiled them in iron kettles filled with fresh water and green dye before drying them on bamboo racks.

During the 1940s, imperial militarism ended refined dining by stressing the patriotism of feeding soldiers. As meat supplies dwindled and citizens reverted to a rice and vegetable cuisine, the Japanese high command substituted tofu in army rations. In defeat, the Japanese family subsisted on famine food and grew kitchen gardens. American suppliers stocked ware houses with horse meat. Despite generosity from the victors, in May 1946, allotments of butter and sugar in Tokyo averaged half of official ration allowances, with rice consumption declining to two-thirds its previous level. Hunger forced citizens to forage for wild food much as the prehistoric Ainu had done. The Japanese government began a propaganda campaign urging consumption of nutritious unrefined rice or blends of rice and barley.

The end of hard times brought a hunger for expansive cookery and varied flavors, especially American-style bread. Cooking once more without scrimping or substituting, Japanese women shopped for the best ingredients they could afford, such as Alaskan king crab, eel, herring, mackerel, octopus, pollock and salmon roe, sardines, sea urchins, and tuna. The demand for fish boosted Japan's consumption to 10 percent of the world's catch. Salad bar ingredients featured indigenous bean sprouts in Japanese *goi gia*.

The popularity of sushi in the 1970s reclaimed a healthful combination of raw fish and rice, a traditional pairing. The Japanese version of nouvelle cuisine elevated fine mousses and puréed fruits and vegetables as bases for revamped dishes, such as tempura. The health food movement promoted edamame beans as alternatives to meat and green tea as a source of antioxidants.

See also: Poisonous Foods; Rationing; Rice; Sanitation; Seaman's Diet and Cuisine;

Seaweed; Shellfish; Tea Ceremony; Tofu.

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[Jefferson, Thomas \(1743-1826\)](#)

One of America's first famous horticulturists, Thomas Jefferson, a founding father, author of the Declaration of Independence, and epicurean U.S. president, cultivated 500 varieties in an experimental vegetable garden, orchard, and vineyard. As chief executive, he hired a French chef, Honoré Julien, to serve distinguished guests the first spring produce and promoted commercial gardening for the citizenry by sharing his seeds with farmers. He also shared seed with naturalist William Bartram and presidents George Washington and James Madison.

Beginning in 1770 at Monticello, his hilltop manor in eastern Virginia, Jefferson applied slave labor to an 80-by 1,000-foot (24-by 300-meter) terraced expanse surrounded by a 10-foot (3-meter) paling fence to keep out rabbits. Overlooked by a modest viewing tower, the terrace faced south and absorbed heat radiated from stone retaining walls.

Jefferson's holdings extended to 300 fruit trees and 24 strains of European grapes. He began the sowing year in February with biweekly seeding of head lettuce, which continued until September. He interplanted with corn salad, endive, Pisan sorrel, and spinach. His employee, Jeremiah Goodman, added a

second lettuce bed adjacent to the stable to accommodate up to 19 strains. A consultant advised arranging cedar or pine branches between rows and overlaying with dry straw to defeat frost.

Jefferson's garden yielded rows of Chilean strawberries, currants, Marseilles figs, gooseberries, and raspberries and a vineyard and 8-acre (3.2-hectare) orchard. From 1794 to 1814, with the aid of head gardener Wormley Hughes and overseer Edmund Bacon, along with slaves Abram, Davy, and Shepherd, Jefferson's herb planting yielded 16 varieties. He believed that heavy manuring strengthened feeble plants against insect attack and reserved cool evenings for work in the rows. In friendly competition with his neighbors, he attempted to harvest the first English peas of spring, even after arthritis stiffened his joints.

Jefferson loved rare and imported edibles, which he served with French Bordeaux wines. He stripped his garden of the mundane and insipid to accommodate such novelties as black salsify, scarlet runner beans, and serpentine cucumbers. His black-eyed peas, broccoli, and squash came from France, his peppers from Mexico, radicchio from Italy, and beans and garlic from Tuscany. On return from his ministry at the court of Louis XVI in France, he imported macaroni, Parmesan cheese, and raisins. Explorers Lewis and Clark brought him beans and salsify from their trek up the Missouri River to Oregon. From Bernard McMahon, a Philadelphia horticultural writer, Jefferson acquired Egyptian onion and Sugarloaf cabbage.

Monticello's beds juxtaposed Arikara beans, cauliflower, and celery alongside Brown Dutch and Spotted Aleppo lettuce and Chinese melon. His native American favorites ranged from hot chocolate, Jerusalem artichokes, lima beans, peanuts, potatoes, and tuckahoe to chokecherries, persimmons, and wild grapes and plums. Jefferson admired the globe artichoke and recorded the tending of asparagus crowns and sweet potatoes from the end of his second term on March 4, 1809, to 1826. His curative herbs include senna, valerian, gentian, cohosh, spurge nettle, lobelia, three kinds of mallow, three kinds of snakeroot, and stramonium, a source of asthma treatments. In 1824, he published in the May 21 issue of *American Farmer* his "General Gardening Calendar," a month-by-month guide to kitchen gardening gleaned from his meticulous notes on sowing, harvest, and seed preservation.

For aesthetics, Jefferson grouped eggplant and okra by color, blanched sea kale

heads, and grew rhubarb for desserts and cherry trees for shade along the grassy walkways. He added orach and nasturtiums to his salad plants and relegated meat entrées to the position of condiments for vegetables. His cooks, Eda and Fanny, made boiled lettuce, gumbo, johnnycake, ketchup, and sweet potato pone and whipped up a salad dressing from sesame oil and tarragon vinegar, sieved egg yolks, mustard, salt, and sugar. His detailed recipes cover precise proportions for making coffee and the amount of salt for curing ham.

See also: Beans and Legumes; Heirloom Plants; Herbs; Ice Cream; Ketchup; Randolph, Mary; Vanilla.

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Jerky

Jerky, a preserved survival meat, exemplifies one of the world's first processed foods. In prehistory, the concept of air-and fire-drying flavorful meat suited the needs of both paleo-Amerindians and Phoenicians. Models of Egyptian honeyed or salt jerky survived in the tombs of pharaohs Amenhotep II and Thutmose III; tomb scenes of Thunefer at Thebes depict the processing of duck or ostrich meat. In the 1500s, the Spanish recorded eyewitness accounts of the Inca of Peru trimming bone, fat, and gristle from beef, deer, elk, horse, and llama muscle and reducing moisture to produce dense, lightweight meals. After salting, Inca processors sun-and wind-dried or freeze-dried the rumps and shanks into

charqui, the Quechuan name for the original jerky.

As did chicle, chocolate, tomatoes, and other New World commodities, jerky intrigued newcomers. Preparers in Argentina, Brazil, Chile, Peru, and Uruguay sliced the meat into strips for sun-drying and tenderized it by pounding it between stones. Dehydration promoted portability for nomadic travel and slave food, and a long shelf life in stone silos and loft bags free from fungus and rot.

Highly competitive South American jerky processors sold dried meat to all comers, who valued its adaptability. In imitation, Spanish sailors converted Pacific island goats into *carne seca* (dried meat) to stock their galleys for long voyages. In reference to the English colonies in *The Generall Historie of Virginia* (1624), Captain John Smith became the first author to refer to beef preservation in the West Indies as “meat jerking.”

Farther north, Great Lakes Ojibwa turned bear and buffalo haunches into a cottage industry of jerky and pemmican, two trail foods valued by Sioux warriors, Ohio River valley fur traders, expeditioners, and pioneers. Buffalo hunters rack-dried enough jerky for clan provisions and trade. Packing jerky with mint discouraged vermin during caching. The preparers sliced cured fat, suspended from the smoke hole of a lodge, and used slabs like bread for jerky sandwiches.

In fall 1766, British navigator Captain James Cook described provisions he purchased in Rio de Janeiro, Brazil. At the rate of 7 pence for 4 pounds (1.8 kilograms), he could buy fresh or jerked beef for his sailors. Brazilians cured the meat with salt and dried it in the shade until they could debone it. After slicing thin strips, they sold it as jerky, which remained fresh at sea. A similar system of curing meat by South African Afrikaners or Boers resulted in biltong, hard, dry strips of eland, elephant, kudu, ostrich, oxen, or fish marinated in coriander, herbs, pepper, salt, sugar, and vinegar.

In the late 1800s, legends of the wily Apache war leader Geronimo describe how he bested white pursuers through the *lava malpais* (badlands), a deadly expanse of black chunks of lava spewed from a volcano and sparsely blanketed in soil. After the U.S. Cavalry foundered on the jagged edges, Geronimo recovered their dead horses and dried the meat into jerky to feed his starving people.

Pacific jerky appealed to less desperate diners. Hawaiian cattle ranching shifted entrées from traditional island fare toward beef and broiled beef jerky, which

they called *pipikaula*, a traditional luau dish. In this same period, Aussie trekkers favored jerky, as did plainsmen, pioneers, wranglers, explorers, and miners who dried long strips of meat on forked sticks in the sun or over a smoky fire.

Today, beef, turkey, and other meat and fish jerky sell well as energy snacks for their low fat, high protein content. Curing and drying reduce tissue moisture by as much as 80 percent. Processors add a variety of sweeteners and flavorings—brown sugar, chili pepper, corn syrup, garlic, liquid hickory or mesquite smoke, maple syrup, onions, and teriyaki sauce.

Specialty shops in Hong Kong and Macau feature fresh sliced jerky, a parallel of the beef jerky sticks and shredded lean meat sold to U.S. backpackers and packed on NASA spaceflights and in gift boxes to American soldiers in the Mideast. Other forms of the global meat snack market include the defatted beef and horse *bresaola* and *slinzega* of Lombardy, wind-dried Armenian and Turkish *pastirma*, donkey or horse *coppiette* in Rome, French beef *brési*, spiced *qwant'a* in Ethiopia, Chinese and Malaysian beef *bakkwa*, Swiss beef *bindenfleisch*, and the Spanish beef *cecina* of León and tuna *mojama* of Phoenician ancestry.

See also: African Diet and Cuisine, Sub-Saharan; Caribbean Diet and Cuisine; Dried Food; Inca Diet and Cuisine; Pemmican; Travel Food.

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Jiménez de Quesada, Gonzalo (ca. 1499-1579)

Córdoban attorney and explorer Gonzalo Jiménez de Quesada introduced Iberia to the Colombian potato, which became a staple throughout Europe and provided a safeguard against famine.

In search of El Dorado, the fabled city of gold in North America, Quesada assumed the post of chief colonial magistrate of St. Marta. In April 1536, he led an expedition of 900 men to the Colombian interior along the Magdalena River into the Andean highlands. More than 82 of the troops died en route from hunger, fever, and snakebite.

After killing Chief Zipa, the Spaniards routed the Chibcha, a nation of mountain traders in cloth, crafts, food, and salt. Upon the approach of the Spanish, the Chibcha fled the Valle de la Grita, abandoning stocks of beans, corn, and potatoes to the insurgents. The region, a fertile plateau east of the Cordillera Mountains, fed starving soldiers on corn and blue potatoes. Although Quesada's travelogue is lost, historians cite a comment that the potato plant grew 24 inches (61 centimeters) high and produced floury, egg-sized roots in blue, red, white, and yellow.

Early in 1537 at Sorocotá, Juan de Castellanos, a cavalryman and epic poet, recorded in his notes for *Historia del Nuevo Reino de Granada (History of the New Kingdom of Spain, 1886)* the Chibchan diet and cuisine. He noted the variety of food and drink—bread made from various roots, a drink called *chicha*, and plantains, a common starchy vegetable, which local cooks usually fried. He detailed how natives made and used clay pots for boiling saltwater. After the moisture evaporated, the salt maker broke the exterior to release a solid salt cake. In addition to the saltworks, Castellanos surveyed tuber culture at high altitudes and compiled the first European comments on the potato. He described it as a Chibchan delicacy that Spanish soldiers liked.

After subduing the Chibcha, Quesada founded Santa Fe de Bogotá, the capital of Nueva Granada (New Spain). In addition to bags of emeralds and gold, he returned to Spain in 1550 with the potato, which he touted for its nutritional value. The tuber sold for a high price to locals, who grew it as an ornamental. Initially, the Spanish compared the plant to the mushroom, called it *tartuffo* (truffle), and fed it to livestock.

Because of the resilience of the potato over long storage, however, ships' provisioners purchased it from the port of Cartagena to feed to the Spanish navy. Cooks prepared the potato as boiled tubers and added it to cakes, flour, and fritters. The potato surprised the military hierarchy by protecting crews from scurvy. By 1585, the potato flourished in the fields of northwestern Europe, where it proved cheaper to grow than rice or wheat.

Because the potato could remain in the ground longer than grain could last in the field, farms were less vulnerable to marauders and more resilient against cyclical crop shortfalls during war and weather disasters. As a food, potatoes adapted to kitchen invention and required no milling or grinding. Across Europe, from Ireland southeast to the Balkans, throughout the Industrial Revolution, governments promoted potato growing as an economical source of food for factory laborers and miners and as a backup against starvation.

See also: Barbecue; Famine; Potatoes.

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K

[Kebabs](#)

Historically, in North Africa and Asia, meats and vegetables braised or roasted on a stick offered a convenient method of moving aromatic dishes briskly to the table for eating without utensils. From the 1600s B.C.E., Greek artisans crafted sets of skewers for slow-roasting meat over fire. Recipes from classical Greece mentioned *obeliskos*— skewered shrimp brushed with honey for roasting over embers, a forerunner of the Greek gyro.

Spitted meat became the standard for meal preparation along the Silk Road from China to the Middle East. For convenience, nomadic Turkish Tartars and the Bakhtiari of southern Iran cooked lamb cubes as kebabs, which they varied with chunks of eggplant, mushrooms, and onions. The Ainu of Hokkaido, Japan, abandoned raw food in preference for roasted and skewered pieces of badger, fox, salmon, sea anemone, and wolf.

Persian cooks made use of limited fuel by cooking meats in small chunks, a kitchen trick they borrowed from soldiers who fire-roasted their dinner on the tip of a sword. Bazaar dining introduced food on a stick with onion kebabs, slices of whole roasted sheep and mutton, and pickled cauliflower and cucumber sticks wrapped in bread. Preparers flavored entrées with cinnamon, garlic, lemon and lime, nuts, onions, parsley, pomegranate seeds, raisins and prunes, and saffron.

In the 900s C.E., in the Muslim city of Baghdad, cooks stoked charcoal to a low flame for simmering red meat kebabs and spitted whole lamb spiced with garlic. Arab and Bactrian merchants traveling the Silk Road to Xi'an in central China contributed Turkish-style grilled and skewered meats to regional cuisine. Ceylonese and Indian traders brought their own version, kebabs with nan.

Mid-medieval cuisine varied the mix of spitted food service. Armenian poetry of the 1100s pictures feasts of heavily spiced lamb kebabs as a symbol of joy and satiety. Italian favorites consisted of fish or seafood threaded on iron rods. Japanese recipes identified various forms of tofu skewered in kebabs. In Beijing's

streets, shoppers munched on skewers of lamb or mutton grilled in the open air and wrapped in wheat pancakes.

In the 1300s, Mongol nomads taught the Chinese *kao* cuisine, toasting meat on skewers over charcoal grills. By placing individual grills on tables, cooks offered informal diners the opportunity to roast morsels to the desired amount of doneness. Ibn Battuta, a Moroccan traveler, discovered kebab cookery in Delhi in 1334. He relished a breakfast of *mash* (peas) and enjoyed meat kebabs with thin slabs of chapati (bread) fried in ghee.

Kebabs in history involved skewered meat in violent and serene settings. In 1504, a Shi'ite warlord, Shah Ismael I, conqueror of Tabriz, Iran, spitted his captives and fed human kebabs to his followers as a test of loyalty. Suleiman I, the sultan of the Ottoman Empire from 1520 to 1566, hunted stag for relaxation and devoured the heart of his kill after his companions roasted the meat kebab style. In seventeenth-century Istanbul, spitted game liver served drinkers as the meat of choice for an evening's debauch.

Tudor England produced a British version of kebabs with game birds skewered on spits and basted with herbed drippings as they roasted on andirons by the fire. After buffalo hunts on the North American plains, children waited their turn for roasted chunks of small intestines wrapped on skewers. In the same era, Ottoman travelers to Erzurum, in eastern Turkey, enjoyed pitas and slices of meat from a *cag kebabi*, a horizontal spit that impaled lamb for grilling and basting with onion.

In early-nineteenth-century France, Marie-Antoine Carême's set of decorative cooking swords skewered delicacies from shrimp to whole fish, an element of the era's baroque cuisine. Late in the era, Hacı Iskender, a northwestern Turk from Bursa, invented the Iskender kebab, a vertical spit that rotates meat over a flame for cooking and slicing in thin strips. His name survived in the Iskender Kebab, a Turkish specialty common to public venues.

After World War II, the Jewish diaspora to the new state of Israel required rationing. To feed 1 million transients and Holocaust survivors, Prime Minister David Ben-Gurion proposed schnitzel and turkey kebabs to replace lamb and veal. Cooks in Botswana, Lesotho, Namibia, South Africa, Zambia, and Zimbabwe developed the *braai*, a barbecue over a gas or wood flame of Dutch-style *boerewors* (sausages), rock lobster, and skewered *sosaties*, the Afrikaans

terms for spiced kebabs. Diners enjoyed their meat with cornmeal mush, *chakalaka* (hot sauce), and chutney.

In the 1950s, Middle Eastern immigrants influenced Australians to balance the standard roast-and-potato menu to include lamb kebabs. Australians and New Zealanders embraced barbecuing for special occasions by grilling game or skewered chicken or lamb and sausages. Among hearty herbed and curried finger foods, British snack trays displayed shrimp satay and Turkish fish and lamb shish kebab served with a national condiment, cucumbers in yogurt. The growth of Caribbean and North American fast food and patio cookouts increased the eating from hands of buns with meaty fillings and of fish, fruit, meat, and vegetable kebabs, a staple of finger food.



A Palestinian street vendor in the West Bank sells grilled kebabs during the holy month of Ramadan, when devout Muslims fast from dawn to dusk. Marinated meat on skewers is pervasive in the Middle East.

(Muhammed Muheisen/Associated Press)

The urge to experiment and personalize has produced myriad kebab variants in modern cuisine. Egyptian, Lebanese, Pakistani, and Turkish immigrants cook bar, street, and van specialties in Central and Eastern Europe, Iberia, Ireland, Korea,

and Scandinavia. Wedding receptions and afternoon teas frequently accompanied small cakes with fruit kebabs, a colorful presentation of grapes, kiwi slices, pineapple chunks, and strawberries. In the 1980s, an example of the nouvelle cuisine at the Papiamento Restaurant on Aruba listed chicken and shrimp kebabs cooked on the traditional island coal pot. U.S. fairgoers jam food booths to taste genuine regional treasures, with chicken pies sharing tables with Malaysian *satay* beef, Arabic shawarma, Greek pork gyros, and Mexican fajitas. A visual treat, Azerbaijani doner kebabs require a rotating vertical spit that cooks chicken or lamb over a flame or electric broiler for service as street food with eggplant, peppers, pilaf, and tomatoes and a wrapping of taboon bread.

Variations of spitted meats—chicken breast, meatball, sausage, sirloin, and swordfish—please consumers in bazaar diners and kebab houses worldwide. Middle Eastern and North African cubes of shark, trout, or tuna require wrapping in grape leaves, perhaps with chunks of cheese, for fitting onto a skewer. Cajun brochettes begin with threading chunks of tasso (pork shoulder) on sticks. Other locales offer gourmet groups authentic street food, a stroller's choice of Filipino eel and frog's legs, Korean *eomuk* (pureed whitefish on a stick), or fried Chinese beetle larva or crickets on a skewer. The Taiwanese favor grilled corn on a skewer topped with cayenne, garlic, onions, and soy sauce. Indian turmeric, grown in the tropics, colors Sumatran *satay padang*, a skewered beef topped with a deep yellow sauce.

See also: Arab Diet and Cuisine; Finger Food; Grilling; Shellfish; Sicilian Diet and Cuisine; Street Food; Tofu.

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Ketchup

A mass-market tomato food enhancer, ketchup defines the American and English taste in salty-sweet, zesty chutney. Derived from *koe-chiap*, a seventh-century C.E. Cantonese fish sauce, the word *ketchup* refers to a condiment based in the 1690s on pickled anchovies or oyster brine mixed with beans, mushrooms, and walnuts. The appeal of a tangy dipping sauce spread to East India, Malaysia, and Singapore.

By the 1700s, British and Dutch explorers and colonial administrators introduced both ketchup and soy sauce to Europe, where cooks made their own gravy substitutes and marinades by replacing soybeans with kidney beans or mushrooms. Nineteenth-century convenience foods inspired industrialists to market condiments, including creamy horse radish, HP sauce (brown sauce), and tomato ketchup. Innovative ketchup recipes named anchovies, cucumbers, gooseberries and other berries, herring, kidney beans, lemon peel, liver, and pome fruit as fundamental ingredients.

American Ketchup

From the Regency period into the mid-Victorian age, the rage for ketchup appeared in the writings of Lord Byron, Jane Austen, Charles Dickens, and Rudyard Kipling. In 1800, U.S. ketchup followed Old World recipes. Imitators used a variety of ingredients, including chestnuts, curry, mussels, oysters, and walnuts until New England cooks settled on tomatoes for the dominant flavor and coloring. Farmers acquired seeds for tomatoes from sailors traveling between Maine and the Caribbean or Mexico. Innkeepers served the tart, ruddy sauce on codfish cakes.

At Monticello, Virginia, Thomas Jefferson's cooks Eda and Fanny made batches of ketchup in iron kettles and stored the sauce in stone crocks. In the undercroft kitchen, they stemmed and seeded the red globes before squeezing out

pulp and boiling it with salt. The all-day job required straining the slurry and adding allspice, cinnamon, cloves, ginger, mace, nutmeg, pepper, and white vinegar before the final boiling and bottling. The yield for 100 tomatoes was five bottles. Jefferson's cousin, Mary Randolph, included the recipe in *The Virginia House-Wife* (1824), the first documentation of American foodways.

In 1837, Jonas Yerkes, a Pennsylvania farmer, became the first U.S. commercializer of ketchup by recycling green tomatoes and cores and skins from canneries into a chutney sold in pint and quart glass decanters. The Thurber Company, a New York grocer, bought Yerkes's business. Although the sauce quickly gained popularity, in the treatise *Lectures on the Science of Human Life* (1839), reformer Sylvester Graham called for a ban on cinnamon, ketchup, and mustard as enervators of the body and precipitators of dyspepsia and exhaustion. Activists agreed with Graham based on unsanitary warehousing of tomato scraps in holding tanks and the enhancement of redness with coal tar.

The development of a suitable tomato for ketchup began in the green house. In 1870, a self-taught hybridizer of heritage cultivars, seedsman Alexander Wilmer Livingston of Reynoldsburg, Ohio, developed the Paragon tomato, a uniform, fleshy fruit and profitable food crop. His hybridization techniques yielded 31 additional tomato varieties, which he categorized by canners, hothouse varieties, and fruit for reducing into a sauce or marinade.

The Heinz Phenomenon

The F&J Heinz Company, a horseradish bottler that operated out of a two-story farmhouse in Sharpsburg, Pennsylvania, produced tomato ketchup in 1876. Heinz ketchup contained salt and vinegar plus allspice, black and white pepper, brown and cane sugar, cayenne, celery seeds, cinnamon, cloves, garlic, ginger, horse radish, mace, mustard seeds, and slippery elm bark. To guarantee customers a wholesome product rather than tomatoes adulterated with turnips or cellulose, the company distributed ketchup in glass bottles. Sealing began with cork, a dip in hot wax, and crowning with foil.

At the Centennial International Exhibition of 1876, the first world's fair in the United States, Americans examined displays of Heinz's tomato ketchup. The

company pioneered advertisements that contributed images of wholesome food and wellness. By buying tomatoes at their peak and offering consistent quality, Heinz was able to undercut the price of competitors. In the first year, the company grossed \$44,474 for its national brand. Heinz profited by shipping 46-gallon (174-liter) tuns of ketchup, America's national sauce, to Australia, Canada, China, Great Britain, Japan, New Zealand, South Africa, and South America.

Into the early twentieth century, for binding and texture, packagers of ready-to-eat tomato condiments added potato and rice flour, oat fiber, and soybean products, standard thickeners that gave authentic mouthfeel. Bottlers volumized ketchup with guar gum, which had eight times the thickening agency of cornstarch. The ban on sodium benzoate by the 1906 Pure Food and Drug Act inspired Heinz to reformulate the recipe to include other preservatives.

In Pittsburgh, Pennsylvania, in 1926, the H.J. Heinz Company selected tomato seeds to grow in greenhouses for its ketchup recipe. The company farmed out plants to contractors who grew the seedlings to maturity from June to August. At harvest, suppliers gathered ripe fruit high in pectin, solids, and texture. In 1942, Gordie C. Hanna, a specialist in olericulture (truck crops) at the University of California at Davis, began hybridizing a small, high-yielding tomato with a firmer skin and more fibrous pulp, an elongated crossbreed of Gem and San Marzano known as Red Top. The crossbreed exhibited an intense ruby hue suited to ketchup and pasta sauce.

The Reagan administration created a stir in 1981 over the reclassification of ketchup as a vegetable in federally subsidized meals. The identification of a condiment as a major part of the diet allowed school cafeterias to reduce nonmeat offerings. So much ridicule erupted in the media that the U.S. Department of Agriculture abandoned the shift of ketchup from salt-and-sugar-laden dressing to vegetable.

By the twenty-first century, ketchup remained in demand at the International Space Station, where laminated retort pouches retained sterility. After salsa outsold ketchup as a condiment, Heinz attempted a resurgence in 2000 by dyeing the red sauce blue and green; it ended the experiment in 2006. Further variations included hot and spicy ketchup, introduced in 2002, and, in 2011, a ketchup made with balsamic vinegar.

See also: Condiments; Guar; Hanna, Gordie C.; Livingston, A.W.; Randolph, Mary; Sauces and Saucing.

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Kitchen Gardening

The planting of berries and fruit, herbs, and vegetables alongside a residence gives visual evidence of respect for fresh ingredients. The first kitchen gardeners grew radishes adjacent to the huts of Egyptian commoners and cabbages, mustard, and onions within the internal *hortus* (garden) of the Roman villa. Formalized in the Middle Ages as abbey and cottage plots, culinary gardening became a convenience for the cook and healer. Seeding and growing involved the full natural cycle, initiated with trench digging as deep as 36 inches (91 centimeters), which encouraged deep rooting of dal and other pulses in Indian house gardens.

In Renaissance Europe, the layout of the *jardin potager* (soup garden) advanced to aesthetic interplantings of aromatic and edible flowers in parterres. Large culinary plots held dwarf trees, shrubs, and vines as well as kidney and runner beans and tomatoes introduced from the New World. Designers structured plots in geometric shapes permeated with walkways and surrounded by heat-retaining walls, which shielded tender currants from frost and melons

from thieves. During early morning perusals, cooks clipped dewy borage and nasturtium blossoms for garnishing, chives and lavender for fragrance, chamomile and gooseberries for restorative beverages, and coriander, mint, and rosemary for savory meat dressings.

Royal Kitchen Beds

In Tudor England, Hampton Court Palace, a Thames-side estate in East Molesey, Surrey, a model of food growing featured orderly walled beds built by chief minister Thomas Wolsey, archbishop of York. For serving guests in the 45 apartments, the kitchen garden produced chicory, endive, fennel, mallow, purslane, rocket, and small-age (wild celery). After Henry VIII purchased Hampton Court in Middlesex, his kitchen bed layout, which abutted the orchard, influenced visitors from Germany with its arrangement of herbs and mints, which he shared with growers about the realm.

At Versailles in the mid-1600s, the *Potager du Roi* (king's kitchen garden) of Louis XIV displayed 44 complex mazes, weeded and harvested daily. His master grower, Jean-Baptiste de la Quintinye, fostered diversity by grafting fruit to foreign stock and by seeding hardy cauliflower, chard, and kale in forcing frames to lengthen the growing season. He trained dewberry vines and cucumbers on trellises and anchored multiple cultivars close together, thus assisting natural hybridization. Quintinye's use of sun-heated walls simulated a microclimate, a basis of pre-season cultivation of fruits, tender pea pods, and young salad greens that influenced colonial gardening. Settlers of Canada emulated the cozy clustering of kitchen beds within hedges and fences.

The idea of a royal kitchen garden came into favor in 1672 with the Kensington palace beds that supplied the table of William III and his coruler, Queen Mary II. In 1844, Queen Victoria cultivated plants and vines at Frogmore Gardens, where a green house and hot house supplied the royal family in London and at Windsor Castle. Head gardener Owen Thomas chose from harvested melons and strawberries and sent flats of fruit to the royal green produce room. In Russia, the aristocratic appetite for the freshest vegetables led diners to devour garden legumes raw. The imperial admiration for fresh produce instilled pity in the elite

for serfs, who tended small kitchen beds as sources of sustenance.

Local Gardening

Industrialization in the mid-nineteenth century produced a flight from agrarianism in Europe and North America. At the same time, changing attitudes toward fresh produce brought a mass swing toward vegetarianism and a diverse diet. Heirloom and hybrid vegetable seeds and tubers abounded, many from California, the kitchen garden of America. Locavores promoted the functional backyard plot as a source of organic produce and a savings on fuel, both for food transportation and for mowing lawns.

At the height of world colonization, friendships with other growers, such as Philadelphia botanists John and William Bartram, furthered discussion of recipes for clover honey, horehound, and rue in cough syrups, lotions, and veterinary salves. The thinning of carrots, leeks, lemongrass, and onions preceded the sharing of extras or sales at farmer's markets. Trades from one kitchen to another involved dividing asparagus crowns and disseminating seeds and rootstock, such as dill, garlic, Jerusalem artichoke, rhubarb, sorrel, and thyme. Seasonal chores concluded with adding stalks and leaves to the compost pile and adding seaweed and manure from the stables to help break down detritus into friable mulch, tasks assumed by the Jesuits on the islands off Macao and the English and Irish settlers of New Zealand and southern Australia.

Sustainable living influenced residential design throughout history, particularly Asian kitchen gardening of the Japanese pea and wild perennials and some 20 Chinese varieties of edamame and green vegetable soybeans. Among the Pueblo of the American Great Basin and black smallholders on Barbados, the reciprocity of herb drying and cooking illustrated the centrality of homegrown food to women, who superintended the planting of gourds and the air-drying of beans.

On the North American frontier, the home plot commanded daily attention and constant replanting of herb and salad crops convenient to the kitchen and storage lean-to. Lacking fresh produce markets and dry goods stores, frontier women such as Ory Baxter, in Marjorie Kinnan Rawlings's historical novel *The*

Yearling (1938), excelled at plowing and seeding. For advice, they turned to almanacs and well-thumbed copies of Bernard McMahon's *The American Gardener's Calendar* (1804), a manual that remained the home culinary standard for over half a century. By involving children in weeding and picking, parents turned produce growing into training in the work ethic and in dietary wisdom.

Gardening in Hard Times

During the economic depression of 1893, kitchen gardening in Michigan helped restore dignity and spirit to the unemployed. In Detroit, Mayor Hazen Stuart Pingree helped 1,000 families sustain themselves by planting home gardens. The city provided implements and seed. Reachin plots and raised potato patches suited the abilities of the disabled and the elderly. Within one season, participants harvested beans, pumpkins, and squash and 40,000 bushels of potatoes. His concept of self-help thrived in Boston, Chicago, Denver, Duluth, Minneapolis, New York, and Seattle.



Suburban neighbors work together in a community victory garden during World War II. Local groups

transformed vacant lots, city parks, and open spaces across America into gardens that produced up to 40 percent of the nation's vegetables and fruits. (*Associated Press*)

During the great conflicts of the twentieth century, American, Australian, Canadian, and European families tended war gardens, called liberty or victory gardens, a patriotic project to supplement rationed foodstuffs with homegrown produce. By 1918, Americans tilled 5,285,000 kitchen gardens that grew around 2,643 tons (2,398 metric tons) of food valued at \$350 million. Chopping and hoeing gave growers a respite from fear and worry about hunger. The effort empowered noncombatants with opportunities to support the military and to uplift their own vitality and hope.

Throughout World War II, families revived depression relief plots in backyards, city parks, and vacant space. Right up to the front door, Irish families planted potatoes in available space. London apartment dwellers turned a bomb crater into crop space. Some 20 million Americans harvested tons of food from yards and rooftops, which publicity agents dubbed "vitamin factories." The U.S. total contributed 40 percent of fresh goods that fed the nation while lowering prices of commercially grown produce and ensuring the diet of soldiers.

American farm agents opened neighborhood canneries as a hands-on teaching experience for homemakers in canning and drying the harvests of their kitchen plots. Posters applauded savings on fuel and proclaimed, "Every war garden a munitions plant." Australians recycled green waste as feed for chickens, a part of the nation's "Dig for Victory" concept. By selling surplus chickens, eggs, and vegetables, community collectives, called "garden armies," raised funds for the Red Cross, Salvation Army, and YWCA (Young Women's Christian Association).

The U.S. Department of Agriculture issued garden handbooks and produced a 20-minute film of a model victory garden planted by the Holder family in northern Maryland. At the White House, first lady Eleanor Roosevelt set the example of kitchen gardening, which citizens emulated in public vegetable plots in Boston, Minneapolis, New York, and San Francisco. A similar example in Hyde Park, London, piqued enthusiasm among beginning gardeners and cooperatives.

The concept of growing ingredients of a healthful diet to fight obesity returned to prominence in March 2009, when first lady Michelle Obama tilled and spaded a patch on the White House lawn. The media applauded her for introducing

young growers to fresh food that rewarded them with flavor and nutrition. Agrarian experts extended the range of edible gardening possibilities from backyard homesteading to containers on balconies, patios, and windowsills.

See also: Espaliering; Green house Horticulture; Herbs; Jefferson, Thomas; Physic Gardening; Travel Food.

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Kitchen Lore

The oral history of food selection and cooking elevates age-old beliefs into mythic science. The holistic approach to where and how plants grow and the phases of the moon that govern their nutritional and medicinal strengths anchors the diet of preliterate cultures worldwide. According to Romanian religious historian Mircea Eliade, the emergence of agrarian lifestyles involved protofarmers in the “oneness of organic life.” The cycle of seasons, when compared with human lives, governed the ability of annual plants to provide nourishment and to resurrect themselves from death through the magic of regenerated vines and seeds, the sources of Greek worship of Dionysus and Demeter.

Unsubstantiated by science, dietary beliefs gained credence because of their longevity and mystery. Preliterate cultures maintained a primal reverence for agave, cassava, eggs, honey, milk, and soybeans. Religious significance attached to such natural occurrences as the fermentation of Persian wine into a religious

intoxicant, the comfort the grieving received from eggplants, and the appearance of corn smut, spongy galls that the Aztec valued as a delicacy. A blend of animism and culinary skill endowed foods with transcendent strengths—algae with the mystic resurgence of the sea, basil with restoring human fertility, ginseng and pepper with revitalization of libido, green tea and piñon nuts for boosting the immune system, salt and smoke with the ability to extend the edibility of fish and meat, and turmeric with sensual pleasures and spiritual fulfillment.

Early Diet Guides

Medieval food commentary favored subjective conclusions, such as the refutations of Galen and Hippocrates's advice on meats proffered in the verse narrative *Regimen Sanitatis Salernitanum* (*Code of Health of the School of Salerno*, ca. 1099), possibly written advice to Robert Curthose, eldest son of William the Conqueror, on the way home following the First Crusade. Hierarchies of roast joints and poached whole fish also arranged the order in which diners should ingest courses, beginning with meat and rounding out meals with bread and coffee. Additional advice specified cures for warts and worms and the types of cider, hypocras, or perry that complemented the dominant humors, bilious, melancholy, phlegmatic, and sanguine. Such specious debate over diet and nutrition illustrated the faulty logic that circulated before empirical science replaced anecdotal evidence with research.

Much kitchen lore featured a time element. According to the anonymous treatise *Provençal Dietetic* (ca. 1290), the seasons placed demands on human digestion. Spring was the right time for lettuce, goat's milk, and chicken, quail, and partridge eggs. Summer was more suited to squash and cucumber, apples, and veal or kid dressed in verjuice or vinegar. Fall brought to the table ripe figs and grapes, chicken, mutton, and game birds cooked in saffron or ginger. Winter was the only time to consume capons and roast chicken, large game, roast meats, and spitted pork and for cracknels retrieved from the larding process.

Merchandising of fresh goods required seasonal calendars such as the anonymous *Le Grant Kalendrier des Bergiers* (*The Great Shepherds' Calendar*,

1491), a moralistic treatise printed by Guiot Marchant in Paris in 1493. Based on astrology, these timetables cataloged when individual items reached their peak of flavor and ripeness and when their qualities complemented body humors. A regimen protecting the body from digestive ill forbade summer brussels sprouts and lettuce, fall lamb, winter chard, and spring boar, root crops, stag, and sweets.

In the late 1960s, Eliot Wigginton, a teacher at Rabun's Gap, Georgia, coordinated research among his high school students of the ancestral lore of Appalachian mountaineers, many of British lineage. Their efforts produced a magazine and, in 1972, *The Foxfire Book*, the first of 11 compendia of photos and interviews. The books summarized planting and harvesting by astrological signs and by beliefs about spring tonics from birch bark, cress, morels, nettles, spicebush, and wild garlic and onions. Two favorite salad greens, mustard and pokeweed, allegedly purified the blood. As a healthful drink and basis for candy and jelly, sassafras earned veneration for thinning the blood and strengthening the heart. By drinking the tonic in March, people ensured a year without depression or sickness.

The Curative Diet

Even in the current age, food lore persists as an amalgam of pseudoscience and hope. Curative legends continue to connect red wine with sustaining the vascular system and the Mediterranean diet of cereals, fish, and olive oil with rescuing victims of Alzheimer's disease from mental oblivion. Introductions to Asian cookery emphasize the Ayurvedic combination of rice with dal, the Mongolian and Turk reverence for koumiss (fermented mare's milk) as a cure-all, and the Chinese balance of cold and hot ingredients to preserve *qi* (energy).

A subset of cookbooks and nutritional manuals, self-help kitchen guides introduce trendy food lore. Individual titles proclaim grapefruits for burning fat, garlic and olive oil as miracle medicines, and fish and nuts as brain stimulants. True believers in kitchen lore look to food for prolonging life, the ultimate benefit. The plethora of life extenders is said to include acai, amaranth, buckwheat, goji berries, and zinc-rich almonds, grains, and pumpkin and sunflower seeds. Extreme kitchen handbooks recommend a retreat from animal

products through veganism.

See also: Art, Food in; Customs, Food; Film, Food in; Literature, Food in; Taboos, Food; Veganism.

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Korean Diet and Cuisine

Based on traditional combinations of fish and meat and vegetables with rice, the Korean diet features the crisp bite of fermented condiments. Developing from simple hunter-gatherer cuisine from 8000 B.C.E., regional cookery depended on available viands, such as burdock, kelp and laver, lotus root, mugwort, mushrooms, scallops, seabird eggs, and silkworm larvae. After 6000 B.C.E., forest dwellers made culinary use of acorns and chestnuts, arrowroot, and turnips. The cuisine acquired an agrarian flair in 1500 B.C.E. from Manchurian immigrants, who introduced the growing and eating of barley, legumes, millet, rice, sorghum, and wheat.

Korean cooks acquired sophisticated means of diversifying taste. Kitchen techniques involved the air-drying of cuttlefish and sardines, the curing of mung and red beans, and the steeping of barley into tea. After 18 B.C.E., cooks of the Baekje realm in southwestern Korea embellished recipes for *kimchi*, a piquant

appetite stimulant pickled in brine. Lactobacilli fermented the mix of shredded cucumber, garlic, mustard leaf, napa cabbage, onions, and radishes into versatile digestives. The mix developed zest from curing underground in traditional flat-topped earthenware jars. Communities judged female cookery primarily from the zing of house hold kimchi.



A shop keep er in Seoul, South Korea, packs a container with *kimchi*, the national dish. A mix of pungent fermented vegetables (mostly cabbage), kimchi complements almost every meal. Koreans consume some 40 pounds (18 kilograms) per person each year. (*Lee Jin-man/Associated Press*)

Outside Influences

Waves of insurgency impacted Korean gastronomy with unique kitchen methods and flavors. After 300 C.E., Buddhist, Confucian, and Taoist foodways replaced traditional cooking with wholesome grain and vegetarian entrées and ceremonial tea service. An elevation of regional vegetable growers as the nourishers of civilization accompanied a mounting disgust for butchers and meat handlers. By the 900s, Chinese gastronomy dominated the peninsula, promoting hot soups as winter warm-ups and sources of fiber and vitamins.

Ögödei Khan's Mongol invasion in spring 1231 introduced *mandu* (dumpling) and glass-noodle making, grilling, and black pepper as the major condiment. The

promotion of agrarianism resulted in early Renaissance manuals, notably *Nongsa Jikseol (Practical Farming, 1429)*, a treatise on grains compiled by state ministers Byeon Hyo-mun and Jeong Cho and translated into Japanese. While the commoner's meal reflected seasonal fare, court dinner tables dramatized a diversity enjoyed only by the privileged, including baby clams, beef brisket, matsutake mushrooms, panfish, ring pheasant, rock tripe, sea bream, and winter melon.

The elite dined five times a day, eating light spreads in the afternoon and before retiring. They began with *miemsang* (breakfast), a serving of *juk* (soupy rice porridge) with additions of abalone, mushrooms, pine nuts, or sesame. Side dishes of oysters fortified the main dish. Main meals in the morning and early evening consisted of heavy casseroles, soups, and stews.

Key to banquet menus, procurements of ancestral bean sprouts and fern shoots, liquor and wine, octopus, pancakes, quail eggs, rice cakes, and sea cucumbers as well as curative herbs and *wakame* (seaweed) kept phalanxes of female cooks occupied. For appetizers, guests wrapped pancakes around strips of bamboo shoot, bellflower root, carrot, mushroom, onion, pine nuts, and shrimp. The final dish, a glutinous rice kneaded with chestnuts, cinnamon, honey, jujubes, pine nuts, soy paste, and sugar, honored guests at birthdays and weddings. Persimmon punch concluded the repast with a gingery, sweet drink high in vitamin C.

Commerce with Europeans, Filipinos, and Okinawans introduced isolated Korean consumers to foods from the Western Hemisphere. In addition to adding corn, squash, sweet potatoes, and tomatoes to recipes, cooks discovered the fiery tang that chili pepper sauce gave to kimchi. By the 1860s, Korean ports welcomed traders from Europe and the United States. Shippers sold upscale grocers liquor from China and spices from Japan.

A 35-year occupation by the Japanese, beginning in 1910, forced Korean smallholders into agribusiness. While earning profits by exporting rice, local farmers grew small kitchen plots of barley and millet for their own pantries. Hard times during the division of the peninsula into North Korea and South Korea in 1948 and during the Korean War in 1950 reduced peasants to subsistence eating to stave off starvation. From U.S. Army supply, cooks acquired canned ham, hot dogs, sausage, and Spam to flavor with chilies and kimchi for a one-pot ragout

called *budae jjigae* (army base stew). American cheese and baked beans plus macaroni, soybeans, and tofu turned the dish into an unpredictable catchall.

Self-Sufficiency

A period of prosperity in the 1960s fostered scientific agriculture and the shucking off of Chinese influence. Industrialists profited from food processing, notably the factory canning of kimchi in 1966 for global export. As fish and meat consumption rose and rice eating declined, Koreans realized the health benefits from decreased dietary carbohydrates and salt and more milk products. Families ate more sesame oil, squid jerky, and soft tofu and consumed 400 tons (360 metric tons) of kimchi annually.

Farm experimentation produced new fruits—bananas, kiwi, oranges—to add to Asian pears and strawberries. Restaurants offered table barbecuing of short ribs over a small grill and settings of spoons and thin metal chopsticks for the selection of noodles from soups and bean curds and julienned carrots and celery from salads. Simultaneous with coastal progress, North Koreans suffered a nationwide famine in 1997 that claimed nearly 2 million citizens.

[Recipe: Beef Soup](#)

Slice 2 pounds of lean beef into bite-size pieces. Boil with one-half of a *mangchi* (Korean radish) in 4 gallons of water. Simmer for one hour. Remove solids and skim fat from the liquid. Slice the beef and radish into paper-thin sections and return them to the broth with five garlic cloves. Bring the mixture to a boil. Add one large green onion sliced into rings and 4 ounces of egg noodles with black pepper and sea salt to taste. Serve after the noodles soften.

In October 2011, weather crises from flooding and typhoons ruined crops and elevated the prices of staples. The World Food Programme estimated that one-third of preschoolers suffered skin infection and stunted development from

malnutrition. According to observations by Mercy Corps, Samaritan's Purse, and World Vision, more than 6 million North Koreans, including pregnant and lactating women, required food aid.

See also: Fermented Foods; Hot Pots; Middens; Pickling; Sausage; Travel Food; Vinegar.

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Kosher Food

Obedience to *kashruth*, Torah dietary law, obligates Jews to follow detailed regimens for food selection and cleanliness. The laws originated in the Bible (Leviticus 11:1–47), during an era when the Israelites kept themselves apart from the Canaanite idol worshippers and child sacrificers who surrounded them. The observant ate ruminants with split hooves—cows, goats, sheep—and meat and roe from finny fish, especially, bass, cod, flounder, halibut, herring, mackerel, trout, and salmon. Jews avoided *treif*, foodstuffs unfit for consumption, including amphibians, camels, carrion eaters, eels, rabbits, shellfish, turtles, and whales. Pigs received a serious injunction because of their propensity for trichinosis infestation.

In the classical era and the Middle Ages, infections from blood and the connection between shellfish and cholera and typhoid fever explained the need for rabbinic inspection of markets to prevent contamination of kosher fish. Jewish butchers followed the specifics of humane slaughter, which required a quick slice

to the carotid artery, esophagus, jugular vein, and trachea. Animal death preceded the immediate draining of blood with a kosher salt solution.



Orthodox Jewish rabbis inspect slaughtered chickens at a Jerusalem processing plant. To earn the kosher label, food preparation must follow strict dietary laws. For commercial foods, an inspector certifies the process, equipment, and facilities. *(Paula Bronstein/Getty Images)*

Relying on word of mouth, devout Jewish house wives patronized a network of abattoirs, bakeries, delis, fish markets, picklers, and wineries governed by respect for scriptural food and sanitation regulations. At home, inspection of grains spared diners from consuming weevils. Orthodox Jews prohibited the mixing of meat and milk in cooking and required separate utensils and vessels for preparing each, as well as separate sets of dishes, kitchen linens, and cutlery. Meticulous observance demanded replacing tablecloths with clean ones between courses as well as hand washing.

Because of the peripatetic history of Judaism, Ashkenazi and Sephardic Jews adapted their foodways through historical culinary borrowing and acquired traditional menus featuring bagels, blintzes, chicken soup, chopped liver, knishes, and matzoh ball soup. In the tenth century, French and Italian clans moved into the Rhine River valley, where scholarly rabbis pondered unavoidable infractions in idiocuisine, the diet and table customs of individual families. During the

religious persecutions of the eleventh and twelfth centuries, roasted pig fattened on chestnuts tested the faith of Sephardic Jews who pretended to convert to Catholicism by eating nonkosher foods. Jewish merchants reverted to pragmatism, shuttling through their shops bacon and ham, along with exotic marzipan, nuts, spices, and sugar.

Over the succeeding centuries, distinctly religious communities arose in Germany, Poland, and Russia. Each displayed religious adherence to kosher meals and table spirituality as forms of nonassimilation. After the discovery of the Western Hemisphere, the potato became a favorite, with latkes assuming importance at Hanukkah. In contrast to European Jewry, modern Israeli cuisine made the most changes over time because of mass immigration, yet the nation maintained kosher taboos, including sifting flour to remove insects.

Early twentieth-century Reform Judaism abandoned kosher rules, which tended to isolate Jews within mainstream society, particularly from community events, hospitals, and commercial diners, cafeterias, fast-food eateries, and restaurants. The 15 to 20 percent of U.S. Jews who observed kosher regulations found adequate choices under the company names Del Monte, Green Giant, Hebrew National, La Briute, Lender's, Manischewitz, Maxwell House, and Smuckers, all of which followed the example of Procter & Gamble, which began marketing kosher Crisco in 1912.

Obedying the precepts of the Orthodox Union's Kosher Certification Service, set up in 1935, the obedient avoid carmine dye, chewing gum, gelatin, marshmallows, micro wave popcorn, nondairy creamer containing caseinate, yeast, and yogurt. They even purchase kosher food for family pets. Cooks examine artichokes, asparagus, berries, broccoli, brussels sprouts, cauliflower, and leafy vegetables for insect infestation. For travel, serious kosher diners purchase self-heating meals and certified salami and smoked fish.

See also: Cookbooks; Farm Subsidies and Government Agricultural Programs; Poultry; Sauces and Saucing.

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L

[La Varenne, Pierre \(1615-1678\)](#)

A rejuvenator of food writing and French cuisine, François Pierre La Varenne redirected national gastronomy from Italian influence and ushered native cookery into the modern age. A native Burgundian, he relished the clean smells and savors of bay leaf, chervil, parsley, sage, tarragon, and thyme. He studied kitchen work in boyhood and climbed the career ladder from pot boy to king's cloak bearer. Trained in the house hold of Queen Marie de' Médici, consort of Henry IV of France, La Varenne served for a decade in Chalon-sur-Saône as personal chef of the Marquis of Uxelles.

In his thirties, La Varenne adopted his unexplained pen name and revolutionized the medieval rules for gastronomy in original cookbooks. He abandoned the heavy Arabic spicing introduced during the Crusades and concentrated on cooking fresh artichoke hearts, asparagus, cauliflower, cucumber, and peas. His menus featured fresh fish and meats roasted in their natural juices as well as salads and fruit drinks, which he summarized in 1650 in *Le Confiturier François (The Preserves Maker)*.

In *Le Cuisinier François (The French Cook, 1651)*, La Varenne systemized the principles of regional fare. Beginning with stocks, his text presented clear recipe ingredients and temperatures, cross-references, and alphabetic indexing. Avoiding issues of dietetics and health foods, he wrote strictly about *haut goût* (full flavor). He codified methods of creating béchamel sauce, bisque, bouillon, coulis (puree), a rudimentary hollandaise from creamery butter, and a Barbe Robert (brown mustard sauce) for topping duck, eggs, fried fish, and roast hare. His detailed instruction covers the bundling of herbs into a *bouquet garni* (garnished bouquet) for accentuating reductions, soups, and stock.

La Varenne followed with an overview of pastry in *Le Pâtissier François (The French Pastry Maker, 1653)* and an omnibus edition of all three of his compilations, which suited a range of needs in army camps and the kitchens of

beginning cooks. He appealed to the amateur by speaking in first person of his own culinary experiences. His precise vocabulary standardized gastronomic terms, including *au naturel* (unsauced), *boeuf à la mode* (pot roast), *oeufs à la neige* (floating island pudding), *poissons au bleu* (rare fish), and ragout.

To rescue dishes from the heavy animal fats that disguised natural flavors, La Varenne stressed butter as a clean fat. He popularized roux, a versatile fried-flour basis for gravies and sauces that replaced the medieval dependence on bread crumbs. He validated Renaissance sweet-and-sour toppings and originated duxelles sauce and a meatless *poivrade* (pepper sauce) from citrus peel, onion, pepper, salt, and vinegar. His menus banished exotica— pheasant, swan, and whale—and concentrated on cuts of meat, poultry, and salmon subtly sauced with capers and herbs.

The chef married well, to the eldest daughter of the Count de Tessé, a military hero. Renowned and wealthy, La Varenne retired to Dijon. At age 63, he died of a four-day fever. Significantly, his texts were the first French cookbooks translated into English. Still in print in 1815, his kitchen tutorials thrived in 30 editions, translations, and pirated versions. His philosophy of light, flavorful cuisine influenced Georges Auguste Escoffier and Julia Child.

See also: Bouillon; French Diet and Cuisine; Pan-European Diet and Cuisine; Sauces and Saucing.

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Language, Food

Fortunately for culinary history, worthy individuals have applied themselves to the collection and recording of gastronomic terminology. In 1900 B.C.E., a Mesopotamian scholar compiled a bilingual Sumerian-Akkadian dictionary on 24 stone tablets. Written in cuneiform script, the text named 800 table items, including 300 types of bread, 100 soups, and 20 cheeses. Additional details from kitchen deliveries at Ur characterized ducks, fresh water fish, geese, lambs, pigeons, and piglets. These lists glimpse the sophistication of the Mesopotamian, leading culinary historians to conclude that the region enjoyed a diverse menu.

Medieval wordsmiths of the quality of Alfarabius and John of Garland compiled words that explained one culture to another. One literary antiquarian, Thomas Wright, a Quaker scholar of Trinity College, Cambridge, compiled the *History of Domestic Manners and Sentiments in England during the Middle Ages* (1862), which cataloged the Anglo-Saxon terms for common objects: *bolla* (bowl), *crocca* (crock), and *disc* (dish). Wright's contribution prefaced the massive effort begun in 1879 by Sir James Murray, who headed a scholarly compilation of the *Oxford English Dictionary (OED)*, also called the *New English Dictionary* (1928), a definitive historical dictionary of the English language in 12 volumes, with a one-volume supplement.

French Influence

After the arrival of Christianity to the British Isles in 597 C.E., English acquired more pantry terms (beet, lentil, lobster, millet, mussel, oyster, and radish) plus plant and herbal terms (aloe, balsam, fennel, hyssop, mallow, pine, rue, and savory). From Scandinavian invaders, the language picked up bull, calf, egg, and steak. The greatest influx of new thoughts and terms arrived with William the Conqueror after the Battle of Hastings in 1066, when Norman invaders brought with them dining styles—collation, dinner, feast, mess, repast, and supper. Specifics enhanced the language with types of fish (bream, mackerel, perch, salmon, sardine, sole, and sturgeon) and types of meat (beef, chine, haunch, loin, mutton, pork, sausage, tripe, veal, and venison).

A rush of Norman vocabulary to the table named meaty dishes (brawn for boar meat and gravy), grain dishes (gruel and pottage), and birds (fowl, partridge, pheasant, pigeon, poultry, pullet, and quail). The baker named his breads biscuit, pastry, and toast; the greengrocer identified plant foods as almond, cherry, date, endive, fig, fruit, grape, lemon, lettuce, orange, peach, and raisin. Shopkeepers dispensed condiments (mustard and vinegar), herbs and spices (cinnamon, marjoram, and nutmeg), and sweets (confection, jelly, tart, and treacle). Also from Normandy came names of basic kitchen techniques, such as blanch, boil, force, fry, grate, mince, roast, scald, stew, quarter, and table vessels, including the basin, cauldron, cruet, goblet, plate, platter, and saucer.

Linguistic Mixing

The intricacies of word introduction extended beyond wars and power shifts to less dramatic borrowings, as with the Teutonic ale, bread, milk, and salt; the low German gherkin; and the Dutch cookie, cranberry, and cruller. Still expanding and redefining itself, the language picked up from the French aperitif, Camembert, consommé, chocolate, and tomato and from Spanish and Portuguese anchovy, apricot, banana, cocoa, marmalade, potato, rusk, sarsaparilla, and yam. From Mexico came avocado and chili; from the West Indies, barbecue and maize. High German added noodle, pretzel, and sauerkraut. Peruvian Quechua speakers coined jerky; Brazil provided cayenne and tapioca. India supplied curry, mango, punch, and toddy. Africa offered food terms from a variety of the continent's languages: *kaffe*/coffee (Ethiopian), *kingombo*/gumbo (Tshiluba), *nguba*/goober (Bantu), *nyami*/yam (Fulani), and *okuru*/okra (Igbo). Additional dribblets came from the Chinese (chop suey), Dutch (coleslaw), Magyar (goulash), Maori (kiwi), Mongolians (koumiss), Persians (pilaf), Turkish (sherbet), Yiddish (nosh), and the English, who named the sandwich after an earl.

North American English offered native vocabulary—hickory, hominy, pecan, pemmican, pone, squash, succotash, terrapin—and the lusty American dialect terms apple butter, hoecake, and popcorn. Subsequent tradings, either directly with foreign cultures or indirectly through American English, produced the Japanese hibachi and sashimi, Polynesian *poi* and taro, Brazilian manioc,

Scandinavian smorgasbord, Turkish shish kebab, and Chinese chow mein, dim sum, kumquat, lychee, tea, and wok.

Century by century, the power and expressiveness of English burgeoned with marzipan, melon, mushroom, and pineapple in the 1500s, and with caviar, macaroni, omelette, and scone in the 1600s. By 1700, English welcomed muffin, pâté, salmagundi, and yogurt. The 1800s added béchamel (white sauce), hors d'oeuvre, ice cream, kipper, meringue, soufflé, and spaghetti. The twentieth century exploded with methods (food processor, microwave, and taqueria) and fast foods (crepe, hamburger, pizza, and tostados).

Unique Terms

The *Oxford English Dictionary* (*OED*) enlightens twenty-first-century readers on food and dining history long in the English-speaking past, such as the derivation of *lady* from the Saxon *hlaefdige* (loaf kneader) and *lord* from *hlaefward* (loaf keeper). One example, the posset, puzzles a generation unfamiliar with the combination of spirits with hot milk to produce a substantial hearthside drink for entertaining as well as a bedtime remedy for chills and colds. Another, the kickshaw, which Joseph Addison mentioned in 1709 in the *Tatler*, is an anglicized version of the French *quelque chose* (something), an offhand term denoting a little dish of sweetmeats, dainties, or trifles cooked up for company. English food expert Hannah Glasse, author of *The Art of Cookery Made Plain and Easy: Excelling Any Thing of the Kind Ever Yet Published* (1747), applied kickshaw to a fruit pie eaten out of the hand.

The *OED* also accounts for eponyms, such as *negus*, a flavored wine named for eighteenth-century Colonel Francis Negus, and *graham flour*, bearing the name of nineteenth-century food faddist and reformer Sylvester Graham. One cook who made the pages of the *OED* was Sally Lunn, an Englishwoman of the late 1700s who created a warm, crumbly yeast bread bearing her name. As a culinary business, she hawked her bread in the streets of Bath, a fashionable spa.

The *OED* preserves a variety of categories of culinary vocabulary along with shades of meaning, alternate spellings, and either an exact derivation, a surmise, or a blank.

Word	Original Meaning	Language of Origin
<i>avocado</i>	testicle	Nahuatl
<i>baxter</i>	baker	Old English
<i>brake</i>	kneading machine	Dutch
<i>brewer</i>	ale maker	Old English from Indo-European root
<i>butter</i>	cow	Scythian
<i>candy</i>	sugar	Sanskrit
<i>cayman</i>	water spirit	Arawakan
<i>chowder</i>	boil	French
<i>coconut</i>	skull	Portuguese
<i>hominy</i>	treated food	Algonquin
<i>ketchup</i>	fish sauce	Cantonese,
<i>mayonnaise</i>	capital of Minorca	French
<i>midden</i>	dung hill	Danish
<i>must</i>	fresh	Latin
<i>orange</i>	orange tree	Arabic from Sanskrit
<i>peel</i>	baker's shovel	Latin
<i>sashimi</i>	pierce the flesh	Japanese
<i>tart</i>	bread	Late Latin
<i>toddy</i>	palmyra palm	Hindi
<i>whiskey</i>	water of life	Old Irish

See also: Literature, Food in; Pennsylvania Dutch Diet and Cuisine; Tea.

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[Lapérouse, Jean François Galaup \(1741-ca. 1788\)](#)

A forerunner of French colonialists, sea captain and explorer Jean François de Galaup, Count de Lapérouse (or La Pérouse), acquainted the Western world with the native foods and diet of Pacific Coast aborigines. By refraining from military intervention in aboriginal life, he and his staff composed valuable observations of island and coastal lifestyles from Tierra del Fuego to New Zealand, where natives ate uncooked herbs and meat to symbolize the elements of the wild.

Born at Albi in south-central France on August 23, 1741, to the Galaup clan, Lapérouse added his family's holdings at La Pérouse to his name as a patronym and reduced the name to one word. After study at Albi's Jesuit monastery school, he completed naval training at Brest in 1756 and, as a midshipman, made a first voyage to supply the French fort at Louisbourg, Nova Scotia.

A subsequent delivery of goods to the French placed him in danger of British shore patrols. At age 18, he survived two battle wounds and a year's imprisonment until his exchange. Courage in additional Atlantic and Arctic naval battles, waged to disrupt British fishing off Newfoundland, boosted his rank to commodore.

During the age of enlightenment, at age 44, Lapérouse led a humanitarian fact-finding expedition circumnavigating the globe, following the path of the British navigator and explorer Captain James Cook, whom a Hawaiian warrior murdered in 1779. To compete with the British for world wealth, King Louis XVI in 1785 instructed Lapérouse to establish trade routes to new markets and to redraw maps of sea-lanes based on sightings of island clusters and shorelines. In addition, the crew searched for unidentified atolls that dotted a flawed Spanish chart, while an academic coterie collected forage plants, fruits, and vegetables to propagate in France.

In exchange for new flora, under royal instruction, scientists carried the seeds of beets, cabbages, carrots, corn, and pumpkins to enrich the diet of Pacific nations. From the Société d'Histoire Naturelle de Paris, Lapérouse received instructions on the types of foodstuffs to collect and methods of packaging and cataloguing seeds with Chinese characters as well as common and Linnaean binomial classifications. The botanists marked mysterious biota *inconnu* (unknown) and left to experts a formal identification. Among his missions, Lapérouse compiled reports on agriculture, fur trading, native nutrition and health, and Pacific whaling.

The Sailor's Diet

Aboard the 500-ton (450-metric-ton) *La Boussole* on August 1, 1785, Commander Lapérouse preceded Captain Leuriot de Langle in *l'Astrolabe* on the combination business and scientific mission to uncharted Pacific territory. To supply a diverse company of sailors and specialists, Lapérouse stocked the two ships with cows, hens, pigs, sheep, and hay as well as sacks of beans, cabbages, flour, fruit, greens, and potatoes. He also filled the pantry with dried fruit, molasses, and malt and spruce essence, all scurvy preventatives.

On Lapérouse's departure, agronomist Jean-Nicolas Collignon, supervisor of the king's gardens, loaded cuttings, roots, and seeds for dispersal of European flora about the Pacific to benefit natives with a more varied choice of nutritious foods. He selected apple and pear kernels and the pits and stones of almond, apricot, cherry, currant, gooseberry, grape, melon, peach, and plum. He also loaded artichokes, celery, chervil, grain, peppers, and root crops—beets, carrots, garlic, onions, parsnips, potatoes, radishes, and turnips. Aboard *La Boussole*, the gardener assembled for distribution a miniature forest of chestnut and fig cuttings, grapevines, quince bushes, and stone fruit and olive trees.

The 220 crewmen survived scurvy by adopting Captain Cook's antiscorbutic diet. One of Lapérouse's provisioners stocked up on chocolate, lemon concentrate, and 100 tablets of antiscorbutic broth of sauerkraut. At the first sign of nutritional deficiency, the captain secured flour, meat, wheat, and fresh vegetables, including white beans, a dried legume that stored well at sea. West of Morocco at Madeira,

he laid in stores of candied lemons, Malmsey wine, and rum. His mariners gladly went ashore to collect celery, onions, and sorrel along streams in the coves and caught cod, flying fish, herring, plaice, salmon, and trout to cook with herbs. In his journals, Lapérouse singled out fresh produce as a basic health need of shipmen and added that he kept salt pork and sea biscuit locked up from the mess cook to serve in emergencies. His comments about the weakening of mariners' strength indicate his concern for the crew's well-being and efficiency.

Pacific Landfalls

The route took the 220 expeditioners west around Cape Horn to Concepción Bay, Chile. In January 1786, Collignon brought European hybrid potatoes back to their New World origin and exchanged them with Chileans for bananas and a variety of vegetables and for the seeds of cotton, lemons, and oranges. He also gathered three types of artemisia, nightshade, starwort, and yarrow for use in beverages, medicines, and salads. The crew sampled Pacific shellfish—abalone, turban snail, and whelk—before sailing northwest in March. Crucial to the survey of valuable flora, the staff's insistence on scholarly notes and drawings resulted in corrections of botanist Louis Feuillée's compendium *Histoire des Plantes Médicinales* (*History of Medicinal Plants*, 1714–1725).

On April 9, 1786, the two ships reached Easter Island, where Lapérouse offered stockmen European goats, pigs, and sheep and seeds for agricultural cultivation. Dr. Rollin, the *Boussole's* chief surgeon, outlined a limited island diet of bananas, chicken, fish, seaweed, sugarcane, sweet potatoes, and yams. To increase dietary variety, Collignon sowed gardens with vegetable seeds and planted orchards with European stock.

To the northwest at the Sandwich Islands (present-day Hawaiian Islands) on May 29, 1786, Lapérouse became the first outsider to survey Maui. While harsh weather kept the two ships offshore, sailors, reduced to one bottle of water per day, looked out on gushing waterfalls and banana trees. According to Dr. Rollin at Keone'o'io Bay, Hawaiian traders approached the ships in 200 canoes loaded with gifts of bananas, coconuts, pigs, and vegetables. While Lapérouse traded with islanders for calabashes, Rollin observed serious human health problems,

notably elephantiasis, leprosy, psoriasis, and venereal disease, as well as swine afflicted with tubercles that rendered the pork inedible.

During exploration of the Canadian coast from the Yukon as far south as British Columbia, at Alaska on June 23, 1786, the expeditioners encountered the Tlingit. In contrast to the ill health of Hawaiians, the robustness of the Tlingit appeared to derive from meals of salmon and trout balanced with food plants—chicory and wild celery—and woods fruit, particularly elderberries, gooseberries, raspberries, and strawberries. From the profusion of pelts from bear, beaver, ermine, fox, lynx, marmot, marten, otter, seal, and squirrel, Lapérouse deduced that meat protein dominated the aboriginal diet. As an antidote to scurvy from a deficiency of vitamin C, the Indians added mimulus and sorrel to their meat soups.

The captain predicted that a harsh winter would reduce the shore people of Lituya Bay to inactivity and near starvation. Thus, hunger would leave them vulnerable to an excess of alcoholic beverages and quarrels over gambling.

Mission Indians

Continuing south, the captain docked at Monterey, California, on September 14, 1786, and perused the tribes domesticated by Franciscan missionaries dispatched to Alta California by Father Junípero Serra of Majorca. Because of transportation problems from the ware houses at San Blas, the missions endured late shipments and rotted or spoiled goods. Lapérouse considered the region a likely place to donate seeds from Paris and bags of Chilean potatoes.

The generosity of the Indians impressed the visitors. The aborigines fleshed out the mission's diet of milk and pea gruel with fresh deer and elk. Monterey Bay supplied the natives with salmon, smelt, and trout as well as abalone, clams, ducks, geese, mussels, seals, sea otters, and whales. In a land of "inexpressible fertility," Lapérouse admired the hunter-gatherers for avoiding the rigors of plowing and planting wheat. He observed the importance of shared food to native life, including acorns, berries, bulbs, dried venison, greens, pine nuts, and seeds. His list of common staples strayed to grasshoppers, mice, songbirds, and squirrels—foodstuffs that Europeans classed as inedibles or vermin.

In defiance of the Franciscans' low opinion of Mission Indians, Lapérouse describes gathered tribes as energetic and adept at food preparation. Women commandeered the caching, drying, shelling, and cooking of acorns, the chief carbohydrate. Intense cleaning concluded with eight

[Recipe: Tuolumne Acorn Stew](#)

Dry and peel black oak or tan oak acorns. Rinse the nutmeat repeatedly with spring water, draining through a filter until all bitterness is leached out. Allow the nutmeat to dry and grind it in a mortar with pestle. Simmer 2 pounds of venison or venison jerky with marrow bones in 1 quart of water until the meat separates. Remove the meat and chop fine. To the broth, stir in 1 cup ground acorn meal. Return chopped venison to the broth. Simmer and stir until the mixture thickens and turns creamy white, flecked with yellow. Flavor with chopped nasturtium petals, peppers, or wild celery, garlic, or onions. Season with pepper and sea salt.

to ten hours of leaching and draining through cedar boughs to remove tannic toxicity and bitterness. Female workers followed by pounding and sifting the gluten-free acorn flour. Lapérouse's journal refers to the beauty and sophistication of their acorn soup preparations, which required stone boiling, the dropping of heated stones into mixtures to heat them.

He refers to ritualized reciprocity as a form of group security. His comments note that Spanish missionaries appealed to natives by sharing exotic European food, such as cow's milk and boiled barley gruel, an Indian favorite they called atole. Native women tried to reproduce the technique of roasting grain. In place of clay and metal pots, they used bark baskets set over small fire pits.

The Western Pacific

In September 1786, Lapérouse stocked his ships' stores with milk, mission chickens, and vegetables and set sail from California west toward southern China. On January 3, 1787, he arrived at the Portuguese colony at Macao to trade Alaskan furs in a Cantonese market already glutted with otter pelts. During the

brief layover, Collignon shipped two tin boxes of plant matter and seeds to André Thouin, head gardener of the Jardin des Plantes in Paris. Thouin was particularly eager to acquire breadfruit saplings for transplant to Isle de France (present-day St. Bart's) and other French colonies as a vegetable ensuring human survival. On February 28, 1787, Lapérouse crossed the South China Sea and approached Manila Bay, where he mailed home to France the first installment of his observations, *Voyage de La Pérouse Autour du Monde (Lapérouse's Voyage Around the World, 1797)*.

In May, Lapérouse sailed north up the East China Sea to Korea and Japan. Among eastern Asians, he observed the common pattern of eating from wood bowls with "little sticks," his term for chopsticks. Because of their shared dining habits, he deduced that East Asians claimed a common origin.

From the Ainu, Japanese aborigines, he acquired maps of Sakhalin, Hokkaido, and the Kuril Islands. Lapérouse's French crew enjoyed regular shore meals of salmon, which they paid for with gifts of alcohol and tobacco. The commander determined to buy little dried or smoked meat, lest he cause the Ainu to starve during winter. The men observed the local use of angelica, dried yellow lily roots, and wild garlic and onions as vegetable flavorings for the meat-heavy Ainu diet. Lapérouse discovered that the shore people ate only the head, spine, and tail of fish and reserved the flanks to smoke or dry and sell once a year to the Manchus who ruled China. The beaching of whales set the people to digging trenches and sinking tubs to collect oil from the rotting carcasses. Because of the dominance of seafood preparation and the garnering of fish oil in animal stomachs and bladders, a fishy stench permeated Ainu kitchens and sleeping quarters.

From Japan to Russia and Samoa

After sailing north through the Bering Strait to Kamchatka, Russia, Lapérouse examined the limited fare of Cossacks and Russians. He found officers growing little patches of potatoes and turnips, an adaptable pair of vegetables for a rough terrain. Hunter-gatherers added cloudberries, cranberries, crowberries, raspberries, whortleberries, and wild garlic to a diet dominated by dried and raw salmon and trout. Favorites included a garlic beverage or sweet herb brandy,

loaves of rye bread, and putrified salmon that had been buried in the ground.

Because Russian ports iced over in winter, the commander on October 7, 1787, sent interpreter and diplomat Jean Baptiste Barthélemy de Lesseps overland by sleigh, horse back, and carriage through Siberia to the French court with letters, charts, and reports. Ironically, de Lesseps saved valuable data from the doomed expedition, which never returned home.

Because the French expedition failed to locate a northwest passage to Hudson's Bay, Canada, royal instructions redirected Lapérouse southeast to New South Wales, Australia, via Samoa and Tonga. In view of lean larders, he rejoiced with his men in the catching of eight bonito and later, a curlew and two sharks, as a relief from monotonous shipboard cookery. To make the curlew edible, the ship's cook stewed it in wine into a salmi, a highly flavored ragout of roast bird and mushrooms.

Upon arrival at Samoa on December 6, 1787, the expedition welcomed trade in coconuts for glass beads and iron items. For each food plant the botanists sampled, Samoans collected one bead. At the Tonga Islands, traders in rickety pirogues bartered for axes, iron, and nails with bananas and coconuts, but no meat. Lapérouse wrote in his journal that islanders lived well off a "pleasant variety" of bananas, breadfruit, chickens, coconut, dogs, guavas, oranges, and pigs.

At Botany Bay, Australia, on January 24, 1788, Lapérouse felt at home among fellow Europeans on the far side of the globe. During a six-week layover, he built a stockade and observatory and dug and built two longboats. In the spirit of agricultural exchange, he seeded an experimental vegetable garden, which was still in use a decade later, when British soldiers tended the rows. Lapérouse received British hospitality and dispatched letters and journals to France in care of the HMS *Sirius*.

Lapérouse's two frigates set out for the Solomon Islands on March 10, 1788, and disappeared in June. The ships wrecked in the New Hebrides at Vanikoro, where cannibals savaged the survivors. The combined knowledge of the expedition's intellectuals—botanists, cartographers, engineers, geographers, linguists, mathematicians, naturalists, physicians, plant illustrators, and ships' surgeons—disappeared with the crew. Letters, dispatches, and journals, the historical survivors of the altruistic food exchange, reached Louis XVI on October

17, 1788, and preserved details of the French survey of unknown people and their cuisine.

See also: Cook, James.

[Larousse Gastronomique](#)

An encyclopedia of food and French cooking history and techniques, the *Larousse Gastronomique* extended into the 1900s the haute cuisine of the previous century. The work of compiler and food expert Prosper Montagné, the 1938 edition exhibited the quality training and experience that he received in hotel restaurants in Brussels, Monte Carlo, Paris, and San Remo. He gave demonstrations at Le Cordon Bleu and wrote about food and tourism for *L'Art Culinaire* and *Revue Culinaire*.

In 1885, Montagné's practical knowledge of dietetics, etiquette, taste, temperature, and appearance convinced him at age 20 to abandon the baroque pastries garnished with congealed mutton fat, silver ornaments, and wax flowers. He recognized the flawed objectives in the architectural *pièce montée* (mounted display) that turned ingredients into decor rather than edibles. After some persuasion, Georges Auguste Escoffier, the "Father of Modern French Cuisine," agreed that table panache did not guarantee delicious food.

The privations of World War I further convinced France's top chefs of the centrality of seasonality, simplicity, and taste to the *fonds de cuisine* (basics of cooking). On field tours of army kitchens in 1917, Montagné tasted ragouts and soups and chided camp cooks for wasting peapods and the tops of carrots, radishes, and turnips as sources of flavor. He stressed the value of fresh fruits and vegetables at the height of flavor.

In 1.3 million words written in longhand from 1933 to 1937, Montagné took a scholarly approach to culinary history, which he entrusted to former writing partner Philéas Gilbert, editor of *L'Art Culinaire*. Escoffier provided a preface and noted Montagné's liberal use of recipes and text from Escoffier's monumental text *Le Guide Culinaire* (1903), a comprehensive compilation of over 5,000 recipes.

Montagné's entries clarified cooking terms and advanced techniques—bisque, farci, fraissage, *galantine*, marmite—and provided biographies of chefs and

commentary on the purchase and storage of foodstuffs for 8,500 recipes. His minutia of beer making and meat curing and the effects of poisonous mushrooms challenged the specialty works of his day. Illustrations included 2,000 drawings and maps and 16 color plates. For his professional vision and historical perspective, Montagné received a Legion of Honor award.

Larousse Gastronomique first appeared in American and British English in 1961 under the editorship of Nina Froud of London and Charlotte Turgeon of Massachusetts. The editors reapportioned metric measures of ingredients and juggled terms, such as *courgette*, into the American *squash* and British *marrow*. The edition maintained the oddities of Montagné's version, which described cooking eggs in sherry and marinating young camel's feet in vinaigrette.

A second edition of *Larousse Gastronomique*, edited by Jennifer Harvey Land and issued in 1988, reflected culinary advances with 900 color photos and 70 black-and-white illustrations. It preceded a longer updated version in 2001 and an abridged edition in 2003. To maintain the work's reputation as the ultimate reference source on cookery, editor Patrice Maubourguet assembled a consulting staff to ensure the authenticity of such details as butchering poultry and employing rare kitchen tools. The 2001 text and its 1,350 pages and 400 photographs reflect an appreciation of the evolution of a diverse global cuisine.

The 2001 index lists 45 biographies of chefs and 64 comments on cafés and restaurants, 59 percent of which operated at Paris locations. The 106 entries on wines cover regional vintages from the Balkans, Georgia, Hungary, Lebanon, New Zealand, and South Africa. Familiar foodstuffs include the less-known eddo, lapwing, *potimarron*, and prickly pear. A catalog of some 3,500 recipes incorporates world favorites, from dolmas, fiddlehead fern, Kurdish lamb, Mikado salad, and tabbouleh to American barbecue, cranberry sauce, and jambalaya. In a critique of the finished product, chef Sheila Lukins declared, "*Larousse* sets the standard."

See also: Cookbooks; French Diet and Cuisine; Haute Cuisine.

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[Las Casas, Bartolomé de \(ca. 1484-1566\)](#)

A Dominican priest and chronicler of Spanish history, Bartolomé de Las Casas surveyed and defended the lifestyle of Indians from Cuba to Peru.

A native of Seville, Las Casas sailed at age 18 to Hispaniola with the 30-ship fleet of the tyrannical Nicolás de Ovando. Upon their arrival at Santo Domingo in 1502, Indians greeted the Spanish with gifts of bread, cooked vegetables, and fish, a harbinger of the purpose of native bondage to feed their enslavers. Las Casas immediately noted that the Spaniards consumed ten times the normal Indian diet.

On Hispaniola (present-day Dominican Republic), the forced labor of some two million shackled aborigines to mine gold and transport it on their backs drew farmers away from fields of *aji* (chili pepper), cassava, garlic, and sweet potatoes. The Indians survived on beans and herbs or starved in corrals as punishment for

finding no ores. When laborers died in neck chains, the Spanish lopped off their heads to save the trouble of unlocking them. The women, left to till the fields, produced too little breast milk to keep their infants alive. Sailors carried young girls to their ships to debauch, leaving them to die of hunger and thirst and their remains to be tossed into the sea. According to Las Casas, depopulation from disease and mistreatment reached 90 percent, further depressing food production. While the Spaniards went hungry, the bondsmen died by the thousands from starvation.

During the Ovando expedition, the Spanish initiated the planting of sugarcane through arduous peon cultivation. Las Casas bought slaves, planted crops at his *encomienda* (plantation) in Cibao in north-central Hispaniola, and fought in Spain's wars against the Taíno. At age 26, he became the first Roman Catholic priest ordained in the New World. He anticipated that he could cultivate highly profitable crops of cloves, ginger, and black pepper on his land. For his atrocities to bondsmen, however, Dominican friars charged enslavers with genocide and denied Las Casas confession for starving his laborers and working them to exhaustion and early death.

In 1513, Las Casas joined in the conquest of Cuba and the massacres of the Ciboney and Guanahatabey. He accepted a second *encomienda* at Cienfuegos in north-central Cuba and a post as chaplain. Echoing in his ears were the pleas of islanders, "*hambre, hambre*" (hungry, hungry). Lack of Christian charity caused Indians to reject evangelism and despise Catholicism.

From Exploiter to Defender

A conversion to nonviolence in 1514 ended Las Casas's role as an exploiter and enslaver. He evangelized colonists to cease abusing aborigines. Aboard the *Santa María de Socorro*, he repatriated to Spain to dissuade King Ferdinand II of Aragon from imperialism by warning him that Europeans were killing off natives of the Americas. Among the priest's complaints was a list of taxes on 500 Peruvian families in Arequipa: 2,000 baskets of peppers, 1,000 bushels of corn, 1,000 hens, 850 bushels of wheat, 180 sheep, 60 baskets of coca, 40 wolf pelts, and 30 pigs, plus fish, tallow, and voluntary field labor for the Spanish planter.

Las Casas's insightful denunciation of imperialism in *Memorial de Remedios para Las Indias* (*A Treatise on the Remedies for the Indies*, 1516) and *Brevísima relación de la destrucción de las Indias* (*A Short Account of the Devastation of the Indies*, 1542) followed his urging of Holy Roman Emperor Charles V to revoke the privileges of absentee landlords and to abjure Indian press gang agriculture and replace it with black African slavery.

Apostle to the Indians

Las Casas accepted residency in the New World as bishop of Chiapas, Mexico, and protector of Indians. He blamed Christopher Columbus for initiating an Indian tribute system, by which farm drudges fed greedy Spanish colonists. From a scheme of temporary provisioning begun in 1496 grew a permanent bondage of first peoples to their European masters.

Ovando institutionalized the system in December 1503, when he received from Queen Isabella a plan to build plantations in the West Indies. Armed Spaniards robbed the granaries of corn and put Indians to the sword; butcher shops sold the human remains as dog food. In particular, Las Casas resented the enslavement of pearl divers, who lived on cod and corn bread while diving repeatedly in search of oysters and dying of diarrhea, exposure to cold, and lung hemorrhage. In Guatemala, he taught Mayans about Christianity through songs rather than starvation or coercion. As a human rights advocate, he devoted a half century to arguing with Spanish overlords that they could profit more humanely from domination of Central America and the West Indies by treating aborigines as human equals.

The core of Las Casas's arguments in favor of peaceful conversion lay in establishing that Indians maintained civilized, orderly lives. For their knowledge of astronomy, medicine, and writing, in his *Apologética historia sumaria* (ca. 1559), he equated Aztec and Inca pagans with the Greeks and Romans of classical times. In defense of the native diet, he extolled peanuts as more delicious than any Spanish snack and compared them to beans, chickpeas, and peas. For agricultural industry, he commended Hispaniolan sugar mills and admired the Maya of Yucatán for the abundance of their beeswax, honey, and fruit. He

praised the Caribbean capsicum, both the long red pepper and the spherical cherry pepper, which became so indispensable to Aztec cookery that cooks featured them in most entrées.

His description of the Taíno mounded fields outlined the swidden system of burning brush to fertilize the soil and the hoeing of hillocks. Laborers pierced each mound with digging sticks to receive cuttings of cassava, which bread makers dried and cooked into loaves on clay griddles. He demeaned Spanish snobbery for rejecting cassava, maize, and yams as kitchen staples and for lamenting the absence of barley, figs and grapes, olives, and wheat, which were unknown in Mesoamerica. In 1542, Las Casas's efforts resulted in the adoption of "New Laws," which ostensibly freed Indians from enslavement and made them Spanish subjects.

See also: Aztec Diet and Cuisine; Cod; Díaz, Bernal.

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[Liebig, Justus von \(1803-1873\)](#)

To ease problems of feeding infants and convalescents, German Baron Justus von Liebig, the nineteenth-century founder of physiological chemistry, created foods for the undernourished and emulated breast milk.

A working-class native of Darmstadt, Liebig was the son of Maria Caroline

Moser, the Swabian manager of a hardware store, and Johann George Liebig, a dyer and salter. Liebig observed the devastation of 1816, when a volcanic eruption in Indonesia caused decreases in global temperature and widespread food shortages in the Northern Hemisphere, which shaped his career in agricultural chemistry. After apprenticing to a druggist for ten months, he studied at the universities of Bonn and Erlangen. In Paris at age 19 under a grant, he received mentoring from a variety of experts—zoologist Georges Cuvier, physicist Joseph Louis Gay-Lussac, and naturalist Alexander von Humboldt.

In his classroom at the University of Giessen, Liebig introduced the laboratory method of pedagogy. In 1828, he perused French sugar refining and imported foreign methods to Hesse. He continued his eclectic study of food processing in England and Scotland and, in 1840, analyzed the nutrients that passed from the soil into the human digestive tract. From his study of the nitrogen cycle, he improvised nitrogen fertilizer and described his findings in *Chemistry in Its Applications to Agriculture* (1840), one of his 15 textbooks.

After proving that chemistry is the same in living and inorganic substances, Liebig boiled meat into soluble and insoluble constituents and discovered the value of *extractum carnis* (meat juices) to consumptives and patients convalescing from intestinal ills. He made his first batch in 1848 to treat a friend's child recuperating from typhus in Liverpool. At the height of the Industrial Revolution, he foresaw the application of beef extract for Europe's "potato-eaters," factory workers who could not afford meat. For his genius and altruism, he accepted an appointment to chair the German Academy of Sciences in Halle in 1852.

Liebig quantified the value of creatinine and albumin in meat and classified edibles by their makeup of carbohydrates, fats, and oils. He began analyzing coca leaves and mineral waters and manufacturing Extract of Malt, a nutritious food more palatable to children than cod liver oil. In 1865, his Liebig Extract of Meat packagers at Fray Bentos, Uruguay, Buenos Aires, Brazil, and Melbourne, Australia, marketed a beef extract later called Oxo.

The reduction of an entire ox to its essence resulted in eight tins selling for 96 shillings. Reconstituted at the rate of 1 teaspoon per cup of water, the powder made 1,000 bowls of soup, a boon to expeditioners Roald Amundsen, Isabella Lucy Bird, Robert Falcon Scott, Ernest Henry Shackleton, and Henry Morton

Stanley. Nursing pioneer Florence Nightingale recommended Oxo for use in hospitals, military kitchens, nurseries and orphanages, prisons, ships' galleys, and work houses. Within a half century, Oxo and Fray Bentos Corned Beef turned a huge profit and created extra income from the recycling of hides, manure, and tallow.

In the mid-1860s, Liebig's experimentation turned to kitchen essentials, including the best way to steep coffee to preserve both flavor and aroma. In 1865, to create synthetic mother's milk, he began with proportional blends of carbohydrates, fats, and protein in a farinaceous food called Liebig's Soluble Food for Babies. For extra strength to infants failing to thrive, he increased the concentration to twice that of human milk and tested outcomes at Munich's Maternity Hospital and at a British foundling home at Bethnal Green, in northeastern London. Historians have called his introduction of artificial milk the world's largest uncontrolled experiment on humans.

In 1867, Liebig's Registered Concentrated Milk Company in London shipped *Kindersuppe* (artificial mother's milk) to American and European markets at 6 pence per quart. He followed the liquid version with a powder of dried cow's milk, malt and wheat flour, and potassium bicarbonate for reconstitution with milk and water. A eulogy in *The Lancet*, a weekly medical journal published in London, honored the reliever of misery in the poor, sick, and wounded. A letter to another scientific periodical from London, the *Medical Times and Gazette*, in 1877 proclaimed the formulation "a panacea to little children from birth, and in every rank of society."

Sociologists rebutted the praise and charged Liebig with encouraging the separation of mother and child. Nonetheless, Henri Nestlé, a Swiss food processor, employed Liebig's research in baby food. German food processor Carl Heinrich Knorr and Swiss food experimenter Julius Maggi used the biochemist's outcomes to make precooked powdered soups.

See also: Baby Food and Infant Feeding; Dried Food; Markets and Marketing.

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[Lind, James \(1716-1794\)](#)

The concern of Scots physician James Lind for diet and pure drinking water consumed by the Royal Navy improved military well-being, earning him the nickname “Pioneer of Clinical Trials.”

Born on October 4, 1716, in Edinburgh, Lind earned a medical degree from Edinburgh University and became a naval surgeon at age 23. He entered practice during an era of heavy food shipments by the British East India Company, which required regular military escorts. During this era, ships at sea longer than one month incurred a high incidence of scurvy, evidenced in achy joints, putrid gums, spotty skin, and weakness.

Lind was appalled by the incidence of scurvy during Commodore George Anson’s 1740 round-the-world voyage, during which half of 2,000 crewmen died, 996 of scurvy and four of battle wounds. While assigned to the HMS *Salisbury* in 1747, Lind initiated the Salisbury Experiment, a test of antiscorbutics on twelve sailors through dietary supplements to galley meals of gruel, mutton broth, pudding, and barley with raisins. Lind divided his five control groups into those dosed with lemon and orange juice, herbal barley water with tamarind pulp, vinegar, cider, and seawater.

After only six days of the 14-day study, Lind determined that scurvy—a nutritional disorder first recorded by Hippocrates and described during the Crusades—resulted from a deficiency of vitamin C, or ascorbic acid, a fact that

the Chinese had remedied in the fifth century C.E. by supplying sailors with ginger. Lind proposed that he could curb the disease by a similar dietary shift—adding fresh fruits and vegetables to galley meals, particularly dishes and beverages containing citrus fruits and juice. By supplementing a diet dominated by biscuit, dried meat, and salt, he promoted the formation of collagen and tissue synthesis to cure anemia and heal swollen gums, loose teeth, subcutaneous bleeding, and blood-stiffened knees and elbows.

Lind's study had a greater effect on naval provisioning than any other commentary on suitable foods for seagoing crews. He followed it with *On the Most Effectual Means of Preserving the Health of Seamen* (1757), which recommended limited alcohol intake and an upgraded diet as antidotes to stomach upset and seasonal fevers. He named as beneficial foods fresh beef and broth with greens as well as bitter herbs, fish soup seasoned with lime juice, and Indian curries.

In 1758, Lind joined the staff of Portsmouth's Haslar Hospital, treating men of the Royal Navy. From the study of thousands of cases of dysentery, scurvy, and typhus, he began improving shipboard conditions to prevent diminished service, crippling, and death of sailors. He proposed a method of preserving citrus fruit juice in a ship's galley and improved life on ships by advocating delousing and better ventilation below deck. He also invented a system of distillation of seawater for drinking.

After publishing *An Essay on Diseases Incidental to Europeans in Hot Climates* (1768), the world's first handbook on tropical medicine, Lind proposed the stationing of hospital ships in tropical ports. For his concern for the health and hygiene of sailors, he earned the title "Father of Naval Medicine." In 1772, the third edition of Lind's treatise explained the German method of making *zoorkool*, a brineless sauerkraut preserved under a heavy weight, which released its juices.

For nearly 40 years, the Royal Navy remained apathetic to Lind's success with improved diet. At the insistence of Sir Gilbert Blane, naval physician and personal doctor of the prince regent, naval administration altered galley practice in 1795, when the addition of citrus fruit to daily fare virtually obliterated scurvy. The effect immediately improved naval morale and effectiveness. For his clinical study, Lind earned a double knighthood.

When the navy purchasing department began supplying ships with limes from

the British West Indies rather than lemons from the Mediterranean, Americans dubbed British sailors “limeys” and their ships “lime-juicers.” The Merchant Shipping Act of 1854 applied similar dietary standards for the British merchant marine.

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[Linnaeus, Carolus \(1707-1778\)](#)

Swedish ethnographer and naturalist Carolus Linnaeus, the “Father of Biological Taxonomy” and “Prince of Botanists,” systemized the Latin classification of organisms into a model of the natural order of the universe.

Born Carl von Linné on May 23, 1707, in the peasant community of Stenbrohult in southeastern Sweden, he studied plants and animals from childhood and observed farming and rural food consumption. His father home-schooled him and spoke Latin with his young child as a basis for future scholarship. After a year in medical school, Linnaeus entered the University of Uppsala in 1728 to study botany and dietetics and made a field trip to the Sami of Lapland (northern Norway, Finland, and Sweden, and the Kola Peninsula of Russia), where he survived on dried fish and reindeer cheese but missed “spoon food.” He concluded that, even without bread, a meat-centered diet is good for health. He recommended sitting lower at the table, cooling food before consuming it, and wearing loose garments, all of which eased the Sami digestion.

Travel enlarged Linnaeus’s interests in food. In Dalarna, Sweden, and London, he sampled local foods and developed an appreciation of pure water as a

beverage. While attaining advanced study in syphilis treatment in Holland, he published *Systema Naturae* (1735), a classification of living things by genus and species. After three years of practicing medicine, he accepted a staff position at Uppsala in 1741 and selected students to conduct field study on world voyages.

Linnaeus's views on food illustrate his application of botanic principles to bolster diet. He considered bread the noblest food. To strengthen Swedish women, he promoted consumption of chocolate, then sold in drugstores in a mix of ground cocoa, ambergris, cinnamon, sugar, and vanilla. He initiated the description of the food chain, and, in 1753, became the first Swedish civilian to receive a knighthood. Five years later, he issued the tenth edition of his book on nomenclature. In his writings, he urged agriculturists to study the life stages of insects as a means of protecting crops from infestation.

In 1757, Linnaeus turned his attention to causes of famine and informed King Adolf Fredrik of the risks of widespread hunger among commoners. Among his list of 30 edible wild plants, his notes contained suggestions of famine food from arum root and pine bark. His dissertation *De Pane Diaetetico (On Bread in the Diet, 1757)* examined the types of biscuits, buns, cakes, flatbread, loaves, pies, and tarts preferred by Swedes. His observations on class differences contrasted the use of wheat by the wealthy and barley and oats by the poor and of the blending of bran, peas, and vetch into soft dough as extenders. His catalog of bread sources listed South African fish bread, American slave bread (corn bread), German potato bread, and millet and sorghum from France and Italy.

Linnaeus detailed classic and foreign bread recipes from Africa, America, and India and the style of milling and storing edible grains to avoid grit and mold in the diet, two sources of gastric complaint. To improve the moisture and flavor of bread, he recommended the addition of currants, egg, and sugar. By choosing the right bread, he believed that consumers could avoid dropsy, flatulence, indigestion, and intestinal disease.

To refine Swedish cuisine, Linnaeus promoted a natural diet and listed as unnecessary cinnamon, coffee, liquor, nutmeg, raisins, sugar, tea, and wine. In their place, he valued fresh fruit as the best food for the hands and mouth and dry rusks as stimulants to digestion through chewing and salivation. For flavorings, he selected aniseed, coriander, cumin, fennel, and saffron, which improved health and stimulated lactation in breast-feeding mothers.

Linnaeus attempted to add crops to Swedish farms to make the nation less dependent on imports. In 1764, Antoine Nicholas Duchesne initiated an eight-year correspondence with Linnaeus, a series of 107 letters on the unisexual and bisexual nature of plant varieties. After 1766, Linnaeus boosted the popularity of the Chilean strawberry, which the French interplanted with the *Fragaria moschata* and *Fragaria virginiana* varieties at Cherbourg to yield fruit 7 1/2 inches (19 centimeters) in diameter. In 1783, Sir James Edward Smith founded London's Linnaean Society by creating a library of the botanist's specimen collections and writings.

See also: Chocolate; Famine; Frézier, Amédée François.

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Literature, Food in

Because of their contributions to human energy and group activities, food and dining anchor countless scenes and themes in world literature. Like a polite servant, the labor that precedes eating often remains shadowed in the background with only brief, but significant exertions visible to the viewer.

In Book VII of Homer's *Odyssey* (ca. 850 B.C.E.), the epicist glides gracefully past humble domestics as the shipwrecked hero Odysseus enters King Alcinous's palace. Homer honors the 50 royal cook staff for hand milling grain for a throng, a massive chore replicated around the world. As the guest, Odysseus sits idle at the hearth anticipating the arrival of a maid with basin and pitcher for predinner

hand washing. The house keeper who makes cleanliness and food available to royal guests passes him bread, a universal token of bounty and welcome.

Homer stresses the gendering of lives, with men providing wild game, while women remain home waiting to spread a table and serve a meal. Upon Odysseus's returning to his hearth in Ithaca after a 20-year absence, Homer prefaces the homecoming with a rush of staff set a-scurry by Eurycleia, the aged house keeper. She demands sweeping, table scouring, and the fetching of water to fill wine bowls and cups. Recognizing the words of the king's top servant, 20 women set about preliminary cleaning while the men perform the hearth work by splitting firewood and choosing "three fat porkers" for slaughter, elements of Mediterranean hospitality that permeate the anonymous *Homeric Hymns* (ca. 650 B.C.E.) and stage drama and comedy of the classical period.

Hesiod, the homebody Boeotian poet living some two generations after Homer, wrote less lyrical verse on toil and toiler. Of the hardscrabble farm life in *Works and Days* (ca. 800 B.C.E.), he makes no embellishment or refinement of scarred hands and sweaty brows. Rather, he focuses on the motions of cooks at lifting away heavy lids from jars and opening fresh wine bottles. His poems speak in pictorial flashes of the good servant and the satisfactions of small pleasures in a pantry chock-full of abundance, proof of the farmer's house hold economy. The farmer's enemies—animals, drought, insects, spoilage— threaten the table with a per sis tent onslaught. The plaint of the beggar Perses accomplishes nothing, for Hesiod, like Aesop's scold in the fable "The Ant and the Grasshopper" (ca. 31 c.e.), has no pity for the slothful.

Feasts

Traditionally, satiric feast literature, such as the *Satyricon* (ca. 60 C.E.) of Roman novelist Petronius Arbiter, focused on the excesses of gluttons, snobs, and social climbers. Rather than eat for sustenance, spoiled diners assessed menus according to the inclusion of out-of-season fruits and vegetables, exotic sweetbreads, and unprecedented blends of flavors and stuffings. Petronius details table perversities: semihatched peafowl eggs, a hare with wings, and a tray of dishes representing the 12 signs of the zodiac—a ram's head, a bull's testicles and kidneys, wineskins

spouting fish sauce into a moat, and the uterus and teats of a virgin sow. At the peak of Trimalchio's feast, the host presents the royal cupbearer and the elegant carving of whole beasts, two emblems of excess that swamped the Roman Empire.

The fall of empires recurs in table scenarios, including the boastful warrior feast in the anonymous epic *Beowulf* (800 C.E.), gluttony and waste during the Qing Empire in Cao Xueqin's (Tsao Hsueh-Chin's) classic Chinese novel *Dream of the Red Chamber* (1791), and the declining Napoleonic regime in Ivan Krylov's Russian fables and William Makepeace Thackeray's *Vanity Fair* (1848). In the final year of the Russian Empire, Muscovite social reformer Alexander Pushkin caricatured the class-conscious posturing of Russian czars Nicholas I and Alexander II. Pushkin's ridicule of the imperial court's banqueting extremes targeted prelates and royalty for alienating citizens and for belittling the peasantry. The unfinished narrative poem *Peter the Great's Feast* (1837) mocks the monarchy's extravagance by implying a lack of dignity in carnivalesque festivities, an insult to Russian culture and husbandry. The parody pictures ordinary citizens as naively expecting only good from the enlightened autocrat.

Hardship

In American literature, food lore has imbued nonfiction and memoir with a fresh appreciation of food getting and meal preparation. In 1903, Southwestern essayist and poet Mary Hunter Austin immortalized the work of Comanche, Mojave, Navajo, Papago, Paiute, Shoshone, and Ute in *The Land of Little Rain*, a lyric study of common toil. The day's survival in Death Valley depends on finding drinkable water. Nomadism demands careful selection of mesquite beans and flour that are unlikely to ferment on the trail. The appeal of supplies turns a crow into a robber capable of stealing bacon and whole potatoes and of competing with human scavengers for berries, chuckwalla (lizards), and turtles. Of fireside labors, Austin surmises that cooking is a form of artistry, just like the weaving of bowls to hold grain and watertight baskets for stew pots.

One of the most graphic descriptions of food service during World War I came from German novelist Erich Maria Remarque's *All Quiet on the Western Front*

(1928), a gritty pacifist novel. Refusing to romanticize the soldier's meal, he pictures food as a focus of young infantrymen. Miles from the western front, both rookies and veterans dream of bellies filled with beef and green beans. During good times, the protagonist, Paul Baumer, receives jars of jam from his mother, who denies herself a full plate while treating her son to a taste of home. The jovial camp cook ladles ample stew to precede coffee, simple pleasures that raise spirits and humanize trench warfare.

In lieu of military supplies, Remarque honors the guile of the forager. Men scout out game or fish or liberate a goose from a farmyard. Against the backdrop of aerial bombing and sporadic rattle of machine-gun fire, they pluck, gut, and cook their bird in the middle of the night in amiable communion over the lucky find. The shared job of basting the bird becomes a unifying and assuaging moment. Paul and his fatherly sergeant carry leftovers to a buddy locked in the stockade, a gift that elevates camaraderie through shared food. The good times set into perspective a hideous war and the uncertainty of staying alive on a ravaged landscape.

Repetitive Chores

In 1936, virtuoso American author James Agee paired with photographer Walker Evans for a survey of sharecroppers and migrant farm families in Alabama. The two produced *Let Us Now Praise Famous Men* (1951), a lyric tribute to the bottom rung of the laboring class. For all of its poesy, Agee's scrutiny refuses to flinch from the poverty that reduces the family to the simplest, sparest of mealtime amenities. Text and photos admire the graceful, repetitive "motions, progressions, routines and retracings" of the cook as she sifts flour through a window screen and mixes in lard, salt, soda, and water for biscuits. As though witnessing a fine choreography, Agee and Evans study thin arms and hands and bare feet as the meal maker slices salt pork into a black skillet, breaks eggs, puts chairs to table, and sets out condiments— sorghum, butter, sugar, salt, pepper. The text dramatizes the seriousness of filling the belly before a full day of fieldwork.

Earlier in the twentieth century, Southern authors memorialized the black domestic, the slave/servant who labored as cook, waiter, and surrogate parent

across Dixie. In William Faulkner's stream-of-consciousness novel *The Sound and the Fury* (1929), Dilsey the cook becomes the matriarchal bulwark of the gentrified Compsons of Jefferson, Mississippi. Faithful to her employers, even on a holiday, she enters the kitchen on Easter morning, stirs fire in embers, and begins rolling out biscuits on a breadboard. Her rising song overtakes a troubled spirit, causing her to set down the sifter, lift her apron hem, and wipe her hands before shouldering thankless chores.

Food escalates in importance in Margaret Mitchell's *Gone with the Wind* (1936) after Abraham Lincoln frees the slaves and armies rob plantations. Ironically, it is the strength and loyalty of Mammy, the O'Hara family house keeper, that enable a newly widowed Scarlett O'Hara Hamilton to face feeding an extended family on her gleanings of neighboring farms. Mitchell ennobles two cook pots, one containing vegetable stew and the other, simmering apples, a meal for nine people that was "hardly enough for two." Like the biblical Ruth scavenging in alien corn, Scarlett continues grubbing up sparse grain and root crops to supply Mammy's larder. In the American West, Fred Gipson, Texas-born author of *Old Yeller* (1956), inadvertently epitomized the work of the wilderness house holder. In a *bildungsroman* of 14-year-old Travis Coates, Papa enumerates the unending food chores—cutting wood for the stove, milking cows, and tending pigs. Overall, he reminds Travis of the corn patch, the source of the winter's bread corn. Mama Coates, the unnamed *materfamilias*, rises to a female version of frontier heroism in her role as head of house hold and mistress of the kitchen. To feed her children on milk, greens, and roots, she tends dairy cows, gathers watercress, and treks "clear over to the Salt Licks" to dig up desert tubers. The image of Mama mastering a blending of corn bread and flour gravy, roasting venison, frying catfish, stewing squirrels, and boiling blackeyed peas suggests the resolve of settlers of the Texas outback to eat well despite hardships.

A new frontier in space influenced the food writing of fantasists Ray Bradbury and Arthur C. Clarke. In Bradbury's *The Martian Chronicles* (1950), a distribution of a matchbox of food pills, defrosted meals from flying icicles, and food tins from a spaceship reduces sustenance to a chore similar to maintenance on mechanical equipment. In *2001: A Space Odyssey* (1968) and *The Fountains of Paradise* (1979), Clarke depicts a similar futuristic feeding of explorers in tubes of prepared food and compressed nutritional tablets, the ultimate in processed

meals. The functional nature of satisfying hunger strips mealtime of camaraderie and cultural memory. Bradbury restores the primitive yearning for campfire eating in *Fahrenheit 451* (1953), in which book salvers gather in the wilderness to share wisdom from the past. To Montag, the protagonist, the dissemination of poetry, scripture, and history reminds him of spiritual food from a tree grafted with a dozen species of fruit and yielding leaves to heal nations.

See also: Darwin, Charles; Díaz, Bernal; Ibn Battuta; Polo, Marco; Religion and Food.

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[Livingston, A.W. \(1821-1898\)](#)

A self-taught hybridizer of heritage cultivars, Alexander Wilmer Livingston in 1870 developed the Paragon tomato, a profitable original food crop.

A seedsman from Reynoldsburg, Ohio, Livingston was born on October 14, 1821, near a stagecoach stop on the National Road to the frontier, where he saw his first wild tomatoes at age ten. Watery and sour, they were ribbed on the outside and hollow at center. After a sketchy education, at age 21 he worked for a local seed grower at the rate of \$8 per month. By 1856, he owned the inventory of the Buckeye Garden Seed Company, which he propagated on his own 70 acres (28 hectares) and on 113 leased acres (46 hectares).

Livingston's trial-and-error method called for planting a field in one variety. Instead of stockpiling the best-seeded fruit, he selected plants with the most promising output. After five years of his reproducing a highly variable parent, the Paragon variety, a "sport" or chance cultivar, emerged unexpectedly, as did the subsequent Perfect and Dwarf Stone varieties. At a time when food processors mass-produced peeled tomatoes in cans, the Hummer and the Paragon varieties earned regard for flawless skin and exceptional taste that suited both canners and shippers. Because the Paragon tomato produced shoots that yielded a late field-crop fruit, it soon rivaled the potato in popularity. Seeds sold for 2¢ each, a price suited to the pocketbooks of farmers.

In 1875, the owner and his 25-year-old son Robert launched A.W. Livingston's Sons, a commercial packet seed company advertising "true blue" vegetable seeds in catalogs and the media to hobby growers and retail outlets. His simple instructions explained the sowing of cabbage, corn, field peas, Hubbard squash, lima beans, muskmelon, onion, parsnip, and turnip seeds before setting plants in the garden. In 1876, testimonials poured in.

Relocated to Columbus, Ohio, Livingston promoted the tomato as a focal agrarian moneymaker. The following year, he sold 4,400 boxes of seeds and advised farmers to plant half their acreage in tomatoes. His specific hybridization produced the heirloom Magnus and Oxheart varieties, the flat-bottomed Perfection, the heavy-bearing Beauty, the meaty Favorite and Lorillard, and the Royal Red, bred for canning whole and remaining solid after cooking. The Potato-Leaf tomato thrived in clay soil and responded to pruning; garden-proud growers liked bragging about the size of the fruit on the New Stone tomato. The Aristocrat and Ignotum varieties grew well in green houses, a quality that won the grower cash prizes from the Iowa State Agricultural Society.

An altruist and volunteer teacher at the Ohio Penitentiary, Alex Livingston determined to satisfy the needs of market gardeners and food preservers. After moving to Des Moines, Iowa, in 1880, he studied exhibits at fairs across the country and contributed articles on state-by-state climate and soil variance to *Station Bulletin*, a publication of the New Hampshire Agricultural Experiment Stations.

To achieve a more uniform, flavorful tomato variety, Livingston cross-pollinated plants that yielded smooth-surfaced, soft-core globes. In 1882, he

produced the Golden Queen, a medium-sized yellow fruit ideal for slicing. Simultaneously, he developed two sturdy potatoes, the Banner and the Seneca Beauty. His hybridization techniques produced 31 varieties of tomatoes, which he categorized by canners, hot house varieties, and fruit for ketchup and preserves. In addition, he sold nine types of celery, the Cannon Ball watermelon, and the Evergreen cucumber.

The grower described his stock in *Livingston and the Tomato* (1893), an autobiography and collection of 60 recipes. He particularly recommended the fruit for feeding invalids. For kitchen versatility, he listed recipes for baking, frying, reducing to butter, roasting, stewing, and making into custard, pie, and soup or serving with macaroni. The text remained a farm standard long after his death, on November 11, 1898. By 1901, his sons, Josiah and Robert Livingston, were selling 6.5 tons (5.9 metric tons) of tomato seed annually. Of the 40 tomato varieties introduced by 1910, one-third were Livingston's superior crossbreeds.

A disastrous fire on April 1, 1919, destroyed a Livingston ware house. Representatives from McCullough's Sons Seed Company in Cincinnati intervened and filled orders to keep the firm in business. Seed savers and collectors have since located documented organic plants, thus reintroducing home gardeners and commercial growers to the mammoth Buckeye State (14.6 inches [37 centimeters] in circumference), the late-keeping Dwarf Aristocrat, the prolific Gold Ball, and the rot-proof Rose Peach, Livingston's most profitable specialty strains of tomatoes.

[Recipe: Uncooked Tomato Pickle](#)

In his recipe collection, A.W. Livingston recommends: "Cut one peck of green tomatoes in quarter-inch slices, sprinkle over them one cup of salt, and let them stand 24 hours. Then drain very dry. Slice 12 small onions thin. Mix one small bottle of prepared mustard, two tablespoonfuls of ground cloves, one tablespoonful of ground pepper, and one of allspice. Then into the jar in which the pickle is to be kept, put alternate layers of tomato, spice, and onions until all is packed. Cover with cold vinegar and let them stand until the tomato looks quite clear, when they are ready for use."

His hometown of Reynoldsburg earned the name “Home of the Tomato.”

See also: Ketchup.

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Local Food Movement

Begun in the early 2000s, the local food movement encourages consumers to subsist on area harvests of flora and fauna, ideally from within a distance of no more than 100 miles (160 kilometers) or so. Worldwide, local shopping extends a marketing system that dates to the Middle Ages, before monoculture turned rural farming into big business.

Throughout Central America, mobile vendors bring diverse crops to crossroads and villages. At Arles, France, the weekly market introduces natives and tourists to baskets and other local handicrafts as well as area grains and flour, cider, mushrooms, stone fruit jams, and whole fresh fish. Australian shoppers in centralized locations embrace farm house cheese, jerky, soda bread, and warrigal greens. In Newfoundland, fresh fish and green house produce draw buyers to produce stands and inns and restaurants, thereby channeling jobs and money into the local economy.

In the United States, in the decade following 1997, farm-to-consumer sales rose by more than 200 percent and increased the amount of local fruits and vegetables purchased for school cafeterias and soup kitchens. Grassroots actions by

locavores and ecofeminists reclaimed the farmer's market and popularized heirloom varieties from gleanings programs, roadside stands, neighborhood abattoirs and apiaries, bread co-ops, and pick-your-own farms and orchards, which first flourished in the 1930s and 1940s. At the same time, gardeners found seeds, seedlings, and tubers for growing at home. The Slow Food movement spawned a parallel resurgence in artisanal sausage, goat cheese and milk, herbs, nuts, wild berries, syrup, and free-range chickens and eggs.



Food vendors set up a booth at a locally grown, organic produce market in the Bedford-Stuyvesant neighborhood of Brooklyn, New York. A growing number of community gardens and special programs bring fresh local foods to the inner city. *(Chris Hondros/Getty Images)*

In 2002, Helen Clifton, a spokesperson for local foods among the Gitga'at nation at Hartley Bay, British Columbia, regretted that family gardening had declined from the 1950s along with food storage of surpluses for lean times. The displacement of native peoples to reservations limited access to traditional plant and animal habitats and to the division of labor by which families harvested and preserved staples from the food web. Children reared on food stamps and government handouts lost contact with an age-old diet. Knowledge and experience of growing, preparing, and preserving food dwindled as the older

generation died out. Clifton feared that junk food, boxed macaroni and cheese, bologna, and hamburgers would supplant local produce, seafood, and shellfish at the family table. She urged elders to instruct the younger generation on the availability of a healthful, natural diet on the Pacific shore.

Currently, consumption of regional produce is gaining vocal converts and advocates as vigorous as Helen Clifton. Teachers use street markets as lessons for the young on where food comes from, how it gets to the table, and why processed foods and beverages exacerbate obesity. Under the influence of enthusiasm for tradition, young U.S. homemakers in New England, the Great Lakes, Arizona, California, and the Pacific Northwest promote ancestral dishes and pride in homegrown foodstuffs, such as heirloom tomatoes, homemade wines, and live geese and rabbits raised for the table. Holiday sales connect consumers with those producing Thanksgiving and Christmas poultry and eggs for dyeing at Easter, Halloween pumpkins, and favorite foods for All Souls' Day altars.

In competition with overprocessed, salted, smoked, and dried foods, locavores stress the freshness of seasonal commodities. Face-to-face commerce with growers ensures low overhead of direct-to-consumer sales, which encourage bartering and involve no sales tax. By shortening the supply chain, local commerce improves food security and sanitation. Regional produce requires less transportation, preservation, and packaging and shorter distribution time from producer to buyer. In 2011, in a new twist on locavorism, "invasivores" crusaded for eating invasive species, especially fennel and field mustard in San Francisco, Canada geese and Japanese knotweed in New York, frog's legs and kudzu jelly in the Carolinas, no-pales in New Mexico, and lionfish caught off the Florida Keys.

See also: Agriculture; Australian Diet and Cuisine; Child, Julia; Ecofeminism; Heritage Foods; Polynesian Diet and Cuisine; Sicilian Diet and Cuisine; Slow Food; Vegetarianism.

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London Virginia Company

The London Virginia Company (also called the Virginia Company of London) harvested New World medicinal and food plants to sell in England. It established an English colony north of the Cape Fear River, stretching north to coastal and inland Canada and east to Bermuda.

Chartered by King James I of England on October 26, 1606, the firm promoted an agrarian economy the following December, to be tended by 144 male volunteers. The settlers, made up of volunteers unfamiliar with farming, hunting, and prospecting, lost 40 workers en route. The rest arrived at Cape Henry on the Chesapeake Bay (present-day Virginia Beach, Virginia) on April 26, 1607.

After three weeks of attacks by Algonquin Indians, the arrivals began raising palisades for a triangular fort on Jamestown Island, a deep but swampy port in tidewater Virginia. Hindering community spirit, more native forays by the Paspahegh Indians, the icy winter of 1607–1608, a town fire, dysentery, malaria, and typhus and ill health from poor nutrition, mosquitoes, and brackish water contributed to squabbling and dissension among the English. Pocahontas, the 13-year-old daughter of Chief Powhatan, visited the fort in January 1608, bringing corn and fish every four or five days. The arrival of Admiral Christopher Newport in September 1608 aboard the supply ship *John and Francis* halted the disgruntled colonists before they deserted the bay.

Because of the deft leadership of Captain John Smith, London profiteers boosted investment. In February 1608, he built a trading alliance with Powhatan by swapping blue beads, copper, and iron for beans, corn, squash, and venison. Settlers, indentured to the company for seven years, immediately began producing glass and potash, stockpiling pitch and tar, making beer and wine,

cutting cedar posts and walnut wainscoting, digging iron ore, planting corn, collecting clams and mussels, and salting cod, hake, and fish roe. They also harvested two native commodities, sassafras roots and the roots of the vining smilax, called greenbriar, the nation's first forest exports. The English had first received the sassafras root from Mexico in 1536 and compounded it into a licorice-sweet root beer and candy flavoring and into a tonic, oil, powder, or tea to treat eczema, impotence, inflammation, migraine, psoriasis, rheumatism, and syphilis.

English merchant John Frampton translated a Spanish text, Spanish physician and botanist Nicolas Bautista Monardes's *Historia medicinal de las cosas que se traen de*

[Recipe: Sassafras Tea](#)

For sassafras tea, hot or cold, collect four young sassafras roots, each about 6 inches long. Remove the bark and wash the inner part. Chop the roots into small pieces and drop into a gallon of boiling water. After cooking for 20 minutes, strain and serve the tea with honey.

nuestras Indias Occidentales, into *Joyfull newes out of the newe founde worlde* (1577), which extolled sassafras as a wonder drug. Doctors so prized sassafras as an Amerindian panacea for arthritis, catarrh, dysentery, ophthalmia, scurvy, and typhus that the market flourished from a "sassafras rush." In 1602, demand boosted the price to £336 per ton. The root had other uses as a smoke, pesticide, and flavoring for liqueurs.

Rescued by Tobacco

From September 1609 to the following May, the "starving time" beset Jamestown, forcing survivors to resort to cannibalism. The arrival of the supply ships *Deliverance* and *Patience* from Bermuda on May 23, 1610, found the sick and malnourished colony reduced from 214 to 60 members and in the process of abandoning the town.

When investors learned of the near collapse of the colony, the London Virginia

Company faced £1,000 in debt and complex litigation. Stockholders countered bad publicity with a vigorous propaganda campaign consisting of broadsides, pamphlets, and 27 books advocating pro-Christian proselytizing of Amerindians and hyping pro-English patriotism, tobacco, and capitalism.

Businessman John Rolfe arrived on June 10, 1610, with contraband seeds from Trinidad of a tastier variety of tobacco (*Nicotiana varina*) than wild Virginia strains (*Nicotiana rustica*). In 1612, at Varina Farms up the James River from Jamestown, Rolfe settled and planted the area's first cash crop, which sold for 3 shillings per pound and challenged the dominance of Spanish tobacco. After wedding his garden-savvy wife Pocahontas two years later, Rolfe began promoting commercial tobacco as the company's staple, a trendy smoke. With Sir Walter Raleigh popularizing pipe smoking, 7,000 tobacco shops flourished around greater London and provided excise taxes for the crown amounting to 12 pence per pound.

By late March 1618, the "great migration" boosted the Jamestown populace from 400 to 4,500. The importation of 20 black captives by the Dutch in 1619 introduced agrarian slavery to the New World. Virginia farmers spent their early profits on imported English wives, whose passage cost 150 pounds (68 kilograms) of top-leaf tobacco each. Called Orinoco tobacco, the crop grew even in the streets and sold well in China, France, Korea, Russia, Spain, and Sweden as a recreational smoke, snuff, a hallucinogen, and a controversial cure for arthritis, epilepsy, and nervous disorders.

New World Economy

By 1620, with the tobacco market from Virginia having grown to 20 tons (18 metric tons) per year, a glut on the sassafras market reduced profits from \$140 to \$56 per pound. Sir Walter Raleigh, who held the patent on sassafras medicinals, complained of an infringement by explorer Bartholomew Gosnold, who had sailed Cape Cod in 1602 in search of the famed root. Jamestown's trade continued in hazelnuts and in medicinal plants—dittany, fustic (smoketree), ginseng, honey, ipecac, jimsonweed, linseed oil, rapeseed oil, saffron, Virginia snakeroot, sumac, and wax. Physicians and apothecaries arrived at the colony in 1621 to practice

their professions and to compound drugs and flavorings from New World flora that ethnographer Thomas Harriot had recommended in his *Briefe and True Report of the New Found Land of Virginia* (1588).

On January 13, 1622, the Jamestown treasurer, John Pory, reported abundant pasturage, deer, turkeys, and wild fruit—five kinds of grapes, cherries, gooseberries, huckleberries, plums, raspberries, and strawberries. He anticipated selling wine as a commodity and received a request for 30 tons (27 metric tons) of sassafras on the return to England of the *Abigail*.

In 1624, the crown rescinded the stockholders' charter, dissolved the London Virginia Company, and made Jamestown a royal settlement. Land values along the Tobacco Coast exploded, creating a demand for property in England's first permanent New World colony. By 1630, planters ventured 30 miles (18 kilometers) up the James River to clear more ground. In 1638, Jamestown advanced to both a burgeoning trading center and North America's first slave market. For a century after the issuance of Nicholas Culpeper's *The English Physitian* (1652), the English continued to demand drugs made from New World plants, including ipecac, rhubarb, sarsaparilla, tobacco, and wild cherry bark.

See also: Cod.

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[Luau](#)

From Hawaii to Samoa and Tonga to the Maori of New Zealand, Polynesians developed the luau, a feast or a community celebration of prosperity. The occasion, first reported by Captain James Cook in the 1780s, honored visits from raconteur Robert Louis Stevenson and Prince Alfred of England as well as the launching of a new canoe on Tonga or a military victory, notably, the Tahitian homage to July 14, Bastille Day.

King Kamehameha II introduced the custom on Maui in early November 1819 by abandoning royal privilege. He abolished the separation of genders at banquets and sat on the floor alongside female guests sharing delicacies that taboos once denied to commoners. Kamehameha III hosted the largest luau on July 31, 1847, inviting 10,000 guests to his estate at Nuuanu Valley. His staff served 4,945 fish, 4,000 taro plants, 2,245 coconuts, and 241 hogs.



The cooks at a traditional Hawaiian luau place hot stones inside pig carcasses (*kalua*) before wrapping them in banana leaves for cooking in a sand pit (*imu*). Rubbed with herbs and covered to keep in moisture, the meat cooks underground for six or seven hours. (B. Anthony Stewart/ National Geographic/Getty Images)

The term *luau*, referring to a spread of indigenous foods—an appetizer of poke (sliced raw tuna or octopus and seaweed) preceding platters of chicken and taro greens baked in coconut milk—first appeared in print in 1856. Diners feasted at place settings of fern fronds and ti leaves. They ate with their fingers rather than utensils. The highest compliment to the host involved loud sucking of greasy fingers.

Hosts cooked in a ground oven known in Hawaiian as an *imu*, in Tongan as an *umu*, and in Maori as a *hangi*, a sand and hot rock pit steamer used to cook *kalua* (whole) pigs, bananas, breadfruit, sweet potatoes, chicken, and flying fish in red Hawaiian salt and banana leaves heaped with damp burlap bags. The dish of note—*kalua*, a pig roasted whole—was typically the event feature for its smoky aroma and savor. Islanders developed in-ground cookery to tenderize wild pig and to kill trichinella, a serious parasite. Chefs served the meat shredded in drippings along with sea snails, *inamona* (*kukui* nut relish), and *haupia*, a coconut milk pudding. Alternate desserts included *faikakai* (baked breadfruit with sugar) or *kulolo* (taro pudding).

For festivals or rituals, communities built the pit oven as the center of attention, a tradition recreated by Samoan chefs in Chicago at the World's Columbian Exposition of 1893 and on Oahu in 1945 for sailors returning from Okinawa's battlefields. Tourism encouraged the arrangement of grand shore or poolside luaus punctuated with chanting, hula, gourd drumming, and fire sword exhibitions or a Maori *haka* (warrior) dance. Chef Sam Choy, formerly of New York's Waldorf-Astoria Hotel, developed the Pacific Rim cuisine at a chain of Hawaiian restaurants and on American Airlines.

Currently, hotels in the Pacific as well as Disneyland and Sea World emulate the luau by staging the stuffing of a pig with hot stones and roasting it in the ground. Because of health restrictions, however, the staff serves kitchen-cooked pork and salty butterfish with rice. Side dishes range from *lomi-lomi* (diced salmon salad) with *poi*, a cream of baked taro corms, to imported blends of onion and tomato with wasabi (Japanese horse radish) and *kalua* turkey, all washed down with Samoan kava or Hawaiian mai tais. Such an evening may involve pineapple bowling with a coconut or honeydew used as the ball.

See also: Beef; Holiday Dishes and Festival Foods; Jerky; Pit Cookery; Polynesian

Diet and Cuisine; Religion and Food; Taro.

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Lunch

Lunch receives erratic commentary throughout history, leading culinary historians to believe that cultures varied widely in the emphasis and time spent on a midday meal. After 3100 B.C.E., the Egyptians soaked bread in water to ferment *bouza* (beer), a nutritious drink that children packed for a school break. The cosmopolitan atmosphere of Imperial Rome included an "anytime" lunch at a street cookshop, where diners sat under a tarp to enjoy fried fish, olives, or a dish of stew with wine in the shade.

The New World set unique standards for a midday meal. In pre-Columbian Peru, cooks baked manioc in earth ovens alongside pork and roasted corn, three hearty foods for lunch. In contrast to a heavy lunch, Spanish conquerors admired the Aztec tortilla, which paired well with cheese, guacamole, and salsa, the typical choices of field hands and school pupils.

In the sixteenth century, open kitchens and travelers' lodgings offered early afternoon fritters, pasties (meat pies), sliced beef or mutton, soups, and turnovers. With less flair, pubs dispensed ale and a cold snack of cheese and meat. At manor houses, the privileged class received hot fish or meat served with wine. Throughout the 1700s, central European farm laborers paused at noon for ale and

bread, a monotonous fortification of the body meant to last until the late-afternoon meal. Colonial Americans tended toward a meat sandwich, corn bread, raisins, fruit pie, and cider.

The Midday Meal and Business

The rise of the industrial class in the British Isles in the 1830s created a need for a portable lunch, which factory workers satisfied with tin pails filled at home with leftovers or by purchasing boiled eggs and sandwiches from lunch counters. In 1850, nutritional research addressed the need of schoolchildren for a wholesome hot meal, the impetus for the building of on-site cafeterias and formal boarding school dining rooms. In 1853, to rid New York City of young vagrants, the Children's Aid Society, under the aegis of Methodist reformer Charles Loring Brace, served America's first free school lunch at the rate of 5¢ each, undewritten by donors. Disabled children arrived at school and returned home via the society's wagon.

In the mid-1800s, lunch added family concerns to mealtime traditions. British gentry emulated the spread of filling entrées served to the family of Queen Victoria and Prince Albert. Australians developed their own version of the English shepherd's pie, a lamb dish topped with mashed potatoes. After electricity and gas increased the intimacy of the American dining room, rural families gravitated from heavy midday eating toward a substantial evening meal.

For urbanites, Walter Scott of Providence, Rhode Island, invented the lunch cart. In 1872, his horse-drawn freight wagon dispensed boiled eggs, egg or ham sandwiches on homemade bread, apple or huckleberry pie, and coffee. He capitalized on second- and third-shift constables, construction workers, journalists, and laborers, whose lunchtime varied from other consumers by eight hours. His competitors altered the lunch menu to include hot dogs, thus changing the name of their service to *dog carts*.

In the southwestern United States, the 1800s saw a flurry of Tex-Mex chili cafés offering spicy one-dish Frito pies in Oklahoma, Kansas, New Mexico, and Texas. In San Francisco, barkeeps offered free lunch to "49ers," mostly male gold miners who claimed no culinary skills and kept no kitchens. In 1872, New

Orleans saloons started advertising a free lunch with the purchase of one drink. Two years later, female temperance volunteers opposed the poorly disguised lure to drinkers. Despite the gender backlash, by 1894, some 60,000 Chicago bar patrons per day received lunch from 3,000 city saloons.

Women devised their own lunchtime havens by opening tearooms, a pleasant diversion and source of female income. Menus featured fresh-brewed tea with sandwiches, pastries, puddings, scones, and tarts. At the Brown Palace in Denver, Colorado, harp music accompanied genteel sandwiches and cookie plates served with clotted cream and black tea or fruit blends, including blackberry and peach.

Global Styles

For garment districts, sweatshop workers relied on finger food—mashed potato or sauerkraut knishe (turnovers)—from coal-burning Ukrainian food carts. At the train station in Topeka, Kansas, in 1876, the Atchison, Topeka, and Santa Fe Railway initiated a chain of 47 Harvey House luncheonettes. Under British manager Fred Harvey, the eateries advertised quality menus and a genteel atmosphere appealing to ladies.

British Asia produced the word *tiffin* to describe a noontime bag or box lunch of chapatis (flatbread), curry, dal (lentils), *dosas* (crepes), or *idlis* (cakes), all suitable foods for schoolchildren, soldiers, and workers. For the elite European, in 1877, the Simplon-Orient Express began serving lunch from a restaurant car. The menu featured partridge and Turkish coffee, a rich fare outdistanced in April 1912 aboard the RMS *Titanic* by a choice of anchovies, brill, herring, ox tongue, or sardines.

For blue-collar Americans, from 1906 to 1961, the Worcester Lunch Car Company dispatched 651 custom-made railcars as wheeled diners from New England as far west as Flint, Michigan, and south to Key West, Florida. Like the Orient Express, the lunch car made its own statement about class and dining with a flashy stainless steel interior and seating on padded stools at the counter. Short-order meals ranged from chili, sandwiches, and stew to “sinkers” (doughnuts) and coffee, all priced on the menu board. Local specialties included Pennsylvania pierogis and Georgia catfish filets with cheese grits.

School Lunch

During World War I, the physical status of draftees alarmed nutritionists. Mothers agreed with scientists that urban schoolchildren should receive balanced noon meals. Schools dispensed simple entrées at a cost of 5¢ to 8¢. To a heavy allotment of bread, the addition of cocoa and milk with crackers allegedly boosted pupils' concentration and retention. Teachers superintended dining and modeled courtesy, hygiene, and table manners.

During the Great Depression, U.S. school lunches gained support from the Federal Surplus Commodities law passed on August 24, 1935. Secretary of Agriculture Henry Wallace bought surplus dairy products, pork, and wheat for use in free cafeteria meals. Between 1937 and 1939, the school districts participating in the allotment rose by 267 percent, from 3,839 to 14,075. By 1942, surplus commodities nourished 6.2 million pupils per year. For rural children bringing cold food from home, Wisconsin developed the "pint jar method," a hot water bath on the classroom stove. At the suggestion of nurse Mabel S. Stevenson, children could set glass jars of chili, cocoa, pasta, soup, and stew in the bath to maintain heat until lunchtime.

On June 4, 1946, President Harry S. Truman launched the National School Lunch Program, a uniquely popular welfare program designed to feed school pupils in all states, Guam, Puerto Rico, and the Virgin Islands. Eligibility studies revealed that children who ate no lunch had substandard reading scores. The program became the single most vital source of nutrients to poor children, invigorating 60 percent with free noon meals. Funds subsidized cafeteria pantries with new taste sensations for some children—bulgur wheat, grits, soy protein, sprouts, and yogurt, all worthy additions to the home diet.

The cost-effective feeding system rapidly replaced sack lunches. The leading demand for free lunches occurred in urban areas: Chicago, 80 percent; Atlanta, 79 percent; and New York City, 72 percent. The national effort boosted the nutrition of school-age children while supplying growers with government contracts for eggs, meat, and milk. A similar program in Jamaica, the Philippines, and Venezuela offered school cooks milk and Nutribuns, a cheap, fortified wheat roll that ensures vitamins and minerals for growing children.

During the 1960s War on Poverty, while nonwhite students from A&T College

demanded service at Woolworth's lunch counter in Greensboro, North Carolina, school cafeterias became battlegrounds as well. Nutritionists and children's welfare advocates fought to expand free and reduced-price meals and debated commercialization via cold sandwiches and snacks purchased from vending machines. Child nutritionists protested junk food and soft drinks consumed in lieu of tax-supported plate lunches and a daily allowance of milk.

In 1972, Congress amended the National School Lunch Act and the Child Nutrition Act of 1966 to allow vending machines to compete with subsidized cafeteria food. Dealers enticed school boards to sign exclusive contracts for machines dispensing candy, chips, and cola. Even with competition from child favorites, in 1990, the U.S. federal lunch program served 24.6 million students.

Contemporary Practices

Child feeding remains prominent in the noontime logic of Japan. Mothers fill *bentos* (convenience lunches) with nori-wrapped rice balls, rolled eggs, and pickled daikon radish wrapped in bamboo leaves to accompany fish or meat.

Disposable polystyrene boxes of lunch and chopsticks sold at convenience stores, take-out franchises, and train depots accommodate workers in Hawaii, India, Korea, the Philippines, South Africa, Taiwan, and Vietnam with sushi and tempura (deep-fried entrées) and salt-and-vinegar–cured apricots, gooseberries, plums, or tamarinds for dessert. From the sharing of field lunch kits at Hawaiian pineapple and sugar plantations came the islands' plate lunch, a portable venue offering dishes of adobo (stew), barbecued ribs, beef teriyaki, fried chicken, miso butterfish, and noodle soup. Workplace buffets serve similar hot entrées and soups in Finland and Sweden and jerk pork in Jamaica and St. Croix. In Cuba, El Salvador, Nicaragua, and Panama, a common lunch dish, *gallo pinto* (spotted rooster) or *Moros y Cristianos* (Moors and Christians), pairs black beans and rice for frying in coconut oil. Cooks who lack meat to add to the mix disguise the absence by stirring in shredded coconut.

In Brazil, Colombia, Guatemala, and Santo Domingo, office workers suspend business for a two-or three-hour lunch, a substantial break for soup, a meat and rice dish, and flan, followed by a relaxed chat over coffee and pastry. Similarly, in

southern France, business associates size up their clients during a 90-minute lunch. Singapore's bankers and office workers retreat to a hawker center (open-air food court) in Chinatown or downtown for a look at the entrées offered by 20 food stalls. American salad bars offer diet-conscious diners a lunch featuring pasta salad, a recreation of potato salad with pasta, vegetables, and vinaigrette.

In Africa and the Middle East, especially during hot days, Muslim males dine apart from women. South African men eat from a common bowl with a spoon or fingers rather than utensils. In Chad, cooking requires a single fire on the ground in the middle of three rocks for the preparation of millet and sorghum gruel served with broiled perch. Diners take two hours to consume noontime stew with rice, fruit juice, yogurt, and tea. After lunch, they dawdle a bit over Arabic coffee.

In contrast to the gender-separate style of Muslims, Jewish cooks spread Sunday tables with a lunch of chicken noodle soup, roast fish, and challah bread eaten with the entire extended family. The Ecuadorian *plato tipico*, a heavy, starchy meal, supplies the traditional *almuerzo*, a sit-down lunch at noon for the whole family. The substantial meal symbolizes familial durability, a cultural cornerstone shared by diners in Bengal, Finland, Germany, Guadeloupe, Hungary, Iberia, and Sweden.

Other cultures—English, Danes, Nova Scotians, Scots—prefer a light repast of a baked potato, bread and cheese, fried clam sandwich, or a protein spread, such as pâté or peanut butter. French Caribbean lunches in St. Bart's and Thai lunch counters tend toward spring rolls and chopped vegetables in rice salad seasoned with vinaigrette. American light fare leans toward grilled cheese sandwiches and tacos as well as fast-food burgers and pizza consumed with cola.

See also: Cooking Schools; Fast Food; Mustard; Pan-European Diet and Cuisine; South American Diet and Cuisine; Street Food.

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[Mail-Order Food](#)

Mail-order convenience has benefited both homemakers and vendors by adding variety and speed to food shopping. Beginning in 1852 with wines from Aristide Boucicaut's Paris store Au Bon Marché, advances in rotary printing made catalog advertising profitable and adaptable to a variety of commerce. The concept of home grocery shopping met with public approval, especially with Montgomery Ward of Chicago beginning in 1875. As advertised in *Farm Journal*, *Machinists' Monthly Journal*, *Missions*, and *Santa Fe Employees Magazine*, the firm guaranteed goods offered in a grocery list, including Alaska salmon, Campbell's soup, coffee, Cracker Jack, Domino sugar, Jell-O, Norwegian herring, pure extracts, raisins, Royal baking powder, and Van Houten's Cocoa. Kays of Worcester, organized in Worcestershire, England, by William Kilbourne Kay in 1890, offered the British shopper gourmet teas by mail. In the United States, the explosive personal wealth of pioneers in northern California inspired merchandisers to ship to the West the luxury foods of the East.

In 1893, Richard Warren Sears of Stewartville, Minnesota, printed the first Sears, Roebuck catalog, the world's most successful groceries-by-mail service. The corporation grew from its Chicago headquarters to some 800 stores in North America. Guarantees printed in English, German, and Swedish promised ease of ordering and returns. Sears supplied isolated farmwives with pantry needs, including crackers, dried and canned fruit, flour, meat, mustard, salt cod, sauces, and vinegar. After the success of a brownie recipe in the 1897 catalog, Sears created a house-brand brownie mix.

Factory-processed foods succeeded with a large customer base. The 1900 Sears catalog listed 18 types of sugar and a broad choice of beverages—four varieties of coffee, two of root beer, three of cocoa, and 22 of tea. Stock ranged from the familiar—egg noodles, gelatin, ground pepper, peas, spaghetti, and Spanish peanuts—to shredded coconut and sliced Hawaiian pineapple from the company's

island plantations. For baking, the homemaker could select chocolate, cracked wheat, raisins and currants, spices, vanilla, and yeast cakes. By fall 1907, the Sears catalog reached 3 million addresses.

In the same era, England's postal service shipped some 130 million parcels annually, many of them in direct response to food ads in magazines and newspapers. The growing use of potatoes buoyed mail orders from female shoppers, typically aged 25–45.

After Richard Sears's retirement in 1908, Sears expanded its food offerings under the aegis of Julius Rosenwald, a Jewish immigrant from Germany. The company's 1923 catalog listed a book on diet and health with a key to calorie counting, along with canned seafood, 25 varieties of canned vegetables, and fruit pie mix. For quick meals, Sears warehoused clams, kippered herring, mock turtle soup, sardines in oil, shrimp, smoked haddock, and tinned salmon. Following the Great Depression, the Great Atlantic and Pacific Tea Company (A&P), Piggly Wiggly, and other grocery chains cut into demand for Sears mail-order grocery line, and the company abandoned food sales in 1941.

Famous stores offered convenience and peace of mind to purchasers of high-priced specialty items for holiday and hostess gifts. Begun by Ray Kubly in 1926 in Monroe, Wisconsin, Swiss Colony advertised bulk cheese, petits fours, and sausage by mail. In Medford, Oregon, Harry & David Holmes featured a Fruit-of-the-Month Club, a marketing ploy introduced in 1938. In 1947, the company's gift-wrapped Tower of Treats extended from pears to baklava, cheese, chocolate truffles, and shortbread. In 1950 in New Orleans, Gambino's Bakery earned a reputation for its Doberge butter cakes and Lenten king cakes containing a plastic Baby Jesus doll. In Nebraska in 1952, Omaha Steaks began vacuum packing prime cuts of beef—filet mignon, porterhouse, and T-bone—and cheesecake. From 1956, Williams-Sonoma in San Francisco mailed out stir-fry sauces, steakhouse rubs, and waffle mixes; Hickory Farms in northwestern Ohio specialized in summer sausage gift boxes. In 1968, for a Yule catalog from Dallas, Texas, Neiman Marcus featured mint candies shaped like green peas. The company's request for 20,000 jars swamped the Italian village where workers hand rolled the candies.

In the 1980s, when department stores lost out to discount shopping malls, mail-order groceries rose in profitability through store credit cards. Later, Internet commerce aided workingwomen as well as diabetics and sufferers of allergies to

dairy, eggs, gluten, and nuts. Bill and Ruth Penzey opened a spice business in Milwaukee, Wisconsin, in 1986, showcasing Tahitian vanilla beans, Vietnamese cinnamon, and Turkish herb blends. Zingerman's in Ann Arbor, Michigan, teased the palate with pistachio cream, Purim pastries, and wild oats granola. Otto's in Burbank, California, distributed Magyar goulash mix and marzipan from Hungary. Paxton & Whitfield, a cheesemonger in Gloucestershire, England, packed hampers of chutneys and patés; Forman & Field of London stocked Alderton ham and *porchetta*.

Today, online send-a-meal sites cater everything from Carolina barbecue to Italian lasagna to live lobster. Corporations reward clients with Collin Street Bakery fruitcakes and Dean & DeLuca premium-grade chocolates and nuts wrapped in colored foil and nestled in baskets. Shippers in California, Florida, and Texas pack and ship clementines, honeybells, satsumas, and valencia oranges in time for Christmas and Hanukkah. The Vermont Country Store in Rutland focuses on hard-to-find items—Austrian wafers, navy bean soup, pierogis, stollen, and wild rice— and such nostalgic treats as Garibaldi biscuits, ribbon candy, Sen-Sen, and Walnettos.

Shoppers worldwide enjoy eel fillets and scallops from Medallion in Charlottetown, Prince Edward Island; Ardtaraig rock oysters and smoked duck from Annbank, Scotland; and jelly and vinaigrette from Saskatoon, Saskatchewan. Australian shippers in New South Wales created a market niche for organic crocodile, lime leaves, and salad mixes. Customers buy artisan cheese, Jamaican jerk spices, Russian caviar, peanut-free sweets, and gourmet desserts and wines from glossy catalogs and online sites, for example, Ontario's www.canadianfavourites.com and England's www.africanfoods.co.uk, www.marksandspencer.com, and www.waitrose.com. In the first decade of the twenty-first century, the U.S. market for mail-order foods was estimated to exceed \$6 billion annually.

See also: Exotic Food Clubs; Hudson's Bay Company.

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Maize

See Corn and Maize

Malnutrition

Malnutrition, the result of eating too little or consuming an unbalanced diet, threatens the immune system and longevity of more than 2 billion people. The rates worldwide are startlingly varied: Only 7 percent of Chinese children are underweight, compared with 28 percent in sub-Saharan Africa and 43 percent in India. An estimated 58 percent of deaths worldwide result from hunger.

Half of fetal and child mortality derives from insufficient nutrition, which besets 30 percent of the global population. Those children who survive the first 24 months in poor conditions suffer underweight and irreversible damage to body and intellect from insufficient protein during growth spurts. In addition to struggling to maintain body temperature and to heal from injuries, the malnourished have a limited chance of overcoming contagious disease, especially enteritis, the number one child killer.

The variety of suffering depends on the type of undernutrition. Pregnant women deprived of vitamin B6 can produce malnourished infants at risk for spina bifida and other birth defects. As a child's weight sinks below 80 percent of normal, marasmus, a lack of protein, deprives the body of musculature and

energy. A similar protein and micronutrient shortage produces kwashiorkor, a wasting of tissue accompanied by edema and ulceration that is common among children in parts of Africa in which cassava dominates the diet.

Specific inadequacies afflict small populations. Iodine deficiency causes cretinism and goiter, a throat tumor associated with the populations of Russia and Siberia. Zinc deficiency leaves children vulnerable to enteritis. A lack of iron results in anemia from insufficient hemoglobin which produces malaise and listlessness. Anemic women tend to die in childbirth or produce anemic infants. Pernicious anemia, a terminal illness caused by an insufficiency of vitamin B12, produces jaundice and numbness. In 1934, George Richards Minot, William Parry Murphy, and George Hoyt Whipple shared the Nobel Prize in Medicine for discovering that iron in raw liver counters the effects. To overcome the effects of a poor diet, Helen Keller International and UNICEF distribute iron and zinc supplements in Mozambique and Uganda.

Vitamin deprivation results in identifiable body anomalies, such as infection and night blindness from a lack of vitamin A. In 1884, Japanese naval physician Takaki Kanehiro treated beri-beri from too little thiamine, or vitamin B1, in the rice-heavy diet of sailors. The deficiency caused heart arrhythmia and swelling. An American doctor, Edward Bright Vedder, began treating beri-beri in 1910 with rice bran, the husk removed from grains of polished rice. The treatment also aided chronic alcoholics and victims of arsenic poisoning.

A deficiency of niacin, or vitamin B3, in the diet can cause pellagra, a severe scaling of the skin and formation of lesions. The disease resulted from the importation of corn to Europe, where farmers neglected to mix the grain with lime. A prime killer in Alabama, Mississippi, and South Carolina in the early 1900s, pellagra remained lethal until 1926, when Joseph Goldberg, a researcher for the U.S. Public Health Service, discovered the value of brewer's yeast in combating the resultant gum disease and porous bones.

For sailors during the Renaissance, scurvy resulted from a lack of vitamin C in shipboard meals. Over three centuries, some 2 million victims succumbed to hemorrhaging from mucous membranes and wounds. Although recognized in Egypt since 1550 B.C.E., the nutritional deficiency received anecdotal treatment from sea captains who fed their crews citrus juice, fresh fruits and vegetables, and pickles, all sources of vitamin C. John Woodall, a surgeon for the East India

Company, issued a simple solution in 1614, when he prescribed artemisia, horseradish, scurvy grass, or sorrel as remedies. In 1747, James Lind, a researcher of naval nutrition, offered citrus fruit as the most practical antiscorbutic.

A common scourge among children of developing countries or institutionalized children, rickets results from insufficient vitamin D and calcium in the diet. A lack of nutrients, as from breast feeding by malnourished mothers, results in stunting—twisted bones and skeletal deformity of skull and spine. Treatment begins with increased exposure to sunlight as an antirachitic (antidote to rickets) and also may include consumption of butter and milk, eggs, and fish oil from herring, salmon, or tuna.

Less common deficiencies involve inadequate vitamin K, a risk for older Thai females, who tend to suffer internal bleeding. For newborns, a lack of vitamin K can cause lethal hemorrhaging. An ailment that affects women worldwide, osteoporosis, a thinning of connective bone tissue, results from deficient calcium in the diet. The fragility of bones may result in serious fractures of the hip and spine, catastrophic losses to mobility for the elderly.

Science has intervened in the effects of malnutrition on the populations of developing countries. A biofortified sweet potato high in vitamin A reduces incidences of blindness and child death. With the aid of the Bill and Melinda Gates Foundation and the World Bank, HarvestPlus in Washington, D.C., is producing zinc-enriched rice and wheat and iron-packed beans and millet. Another project elevates vitamin A in bananas, cassava, and corn. In France, pediatrician André Briend concocted Plumpy'Nut, a nutritive peanut paste of milk, oil, peanuts, and sugar. The efficient nutrient delivery system emptied hospitals of patients on intravenous feeding in Malawi and helped to relieve the underfed in Ethiopia, Haiti, Nicaragua, Niger, Somalia, and Yemen.

See also: African Diet and Cuisine, Sub-Saharan; Airlifts, Food; Famine; International Food Aid; Liebig, Justus von; Lind, James; Linnaeus, Carolus; Rumford, Count; Russian Diet and Cuisine; Seaman's Diet and Cuisine; Soup Kitchens; Yeast.

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[Mandarin Diet and Cuisine](#)

The diet of Shandong Province, Mandarin cuisine has refined much of Chinese cookery with elegant touches. From a repertoire of 4,000 recipes, heavily sauced dishes from the royal table in the Forbidden City satisfied the expectations of the imperial family and Manchurian noblemen for centuries. In Beijing's streets, shoppers munched on skewers of lamb or mutton grilled in the open air and wrapped in wheat pancakes. Vendors offered Mandarin snacks, notably, Mongolian barbecue and fried chicken seasoned with fermented tofu, garlic, scallions, sesame, soy paste, and vinegar.

During the Ming dynasty (1368–1644), imperial food service required a cadre of 5,000 kitchen workers. Regional Huaiyang specialists opened restaurants featuring mildly flavored delicacies from north of the Yangtze River based on fresh water fish and pork. The subsequent Qing dynasty, which ruled until 1912, countenanced the monopoly of catering guilds, which stratified foods and dishes by social and economic class. At the imperial compound, the main meal of the day, presented around 2 p.m. featured two or three tables of entrées, three of cakes and cereals, and a small side table of preserved vegetables.

[Recipe: Peking Duck](#)

Defat a duck by removing the tail and feet and suspending the carcass with

string in a constant airflow for four hours. Place the fowl in a strainer and salt the surface. Bathe in a sauce of 3 tablespoons of honey, 1 tablespoon each of sherry and rice vinegar, one slice of ginger, one chopped scallion, and 4 teaspoons of cornstarch whisked in water. Suspend the duck for an additional six-hour period.

Bake the duck, spine side up, at medium heat for 30 minutes on an oiled oven rack above a bain-marie (double boiler). Turn the duck and bake it for another half hour. Crisp the duck in 4 inches of oil in a wok for three minutes. Serve the sliced meat with its crisp skin and hoisin sauce.



Chefs at a Beijing restaurant fill buns with pork and place them in bamboo steamers. Mandarin cuisine, the food of China's northern imperial courts, features wheat rather than rice. Steamed buns and noodles are preferred side dishes. (*Liu Jin/AFP/Getty Images*)

Until the coming of nationalism in the 1920s, which rid halls of feasting as a politically incorrect extravagance, the Manchu-Han Complete Banquet flourished among the wealthy and privileged; coordinated wait staff displayed hundreds of dishes. From the time of the Emperor Qian-long (1735–1796), event planners featured classical opera as a backdrop for the exquisite presentation of bear, bird's nests, and lily roots, prepared by 400 chefs.

Imperial cooks created such exotica as duck webs and cold fish maw (stomach) and the stand-alone highlights moo shu pork in crepes and crisp Peking duck, an imperial favorite from the mid-fourteenth century. Similar showcasing of a single staple advanced the popularity of tea eggs and chicken velvet, a forcemeat of chicken breast stabilized by egg whites. Chefs de-emphasized rice and carved vegetables, while stressing distinct tastes of dumplings and steamed buns.

Often compared to French cuisine, Mandarin dining lets such entrées as lemon chicken and lion's head pork set the tone of a meal. Skill at battering and temperature control produces such specialties as crispy shrimp hors d'oeuvres and flowering peanuts. "Red cooking" braises poultry with an aromatic liquid combining ginger and wine with soy sauce. Glacéed bananas, which American Mandarin specialist Cecilia Sun Yun Chiang introduced at San Francisco's Ghirardelli Square in the 1960s, arrive at table coated in a crackled caramel.

In contrast to Cantonese and Szechuan Chinese steamed vegetables and rice, Mandarin food stresses an aristocratic approach to cooking. Table service dramatizes expensive meats and such rare ingredients as shark's fin and sea cucumber. Under these high standards, minced squab and beggar's chicken wrapped in lotus leaves and baked in hot ash emphasize light and tender meaty flavor over the salty or spicy tastes of peasant fare. Unique combinations—double-fried walnuts and mayonnaise shrimp, for example—appeal to the tastes of China's elite.

See also: Aphrodisiacs; Noodles; Polo, Marco; Poultry; Silk Road.

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Manioc

A cheap, drought-tolerant famine crop, South American manioc (also called cassava or yuca) provides much of the tropics and subtropics with a chief source of carbohydrates. Originating in Guatemalan vegiculture, manioc (*Manihot esculenta*) flourished in sweet and bitter varieties. When sieved and squeezed, it produced a liquid starch for use on bark paper and fabric.

Brazilians and eastern Peruvians first encountered the 5-to 12-foot (1.52-to 3.66-meter) plant in 10,000 B.C.E. and elevated it to a trade commodity along the Lower Amazon, Orinoco, and Guiana rivers. Neolithic, or New Stone Age, food technology around 8000 B.C.E. shifted emphasis from raw meat to cooked beans, grain, and manioc.

In the Western Hemi sphere, the tuber grew wild in Venezuela in 5000 B.C.E., in Central America and the Mexican lowlands from 4600 B.C.E., and in Puerto Rico from 1300 B.C.E. With hoe and machete, the Maya of El Salvador cultivated manioc as early as 600 C.E. and cooked the pulp on clay griddles.

All manioc is toxic. The Tupi of Brazil pulped bitter manioc on stone graters and removed prussic acid, a poisonous hydrocyanide. Without proper soaking to remove the cyanide, the tuber caused goiter and a shambling gait from neuropathy. The Tupi processed the detoxified fiber into meal, pancake-shaped loaves, tapioca, and a table dip or sauce called *tucupi*, which tenderized servings of fish and game in a pepper pot stew.

Across northern South America, the tuber generated a common menu item, appearing in Peruvian earth ovens alongside roasting ears and pork, and as *carimañolas* at the breakfast buffet and *enyucado* at lunch in Cartagena, Colombia. Manioc also supplied South Americans with *chicha*, a coconut-flavored beer made from fiber chewed by brewers and fermented with salivary enzymes.

The Americas and Europe

In the Caribbean on November 16, 1492, Christopher Columbus first saw the Taíno grating manioc for flatbread and porridge. As a food store for hard times and supplies for voyagers, they planted uninhabited parts of the Lucayan Islands with the tubers, which could remain in the ground unharvested until needed. Native cooks peeled the root with clam, conch, mussel, and whelk shell tools; the spine of the stingray served as a grater. Cuban natives made graters by permeating hardwood slabs with stone chips and setting the apparatus in a trough. In the Bahamas and Cayman Islands, the Carib fermented manioc pulp into beer.

In the early 1500s, natives on St. Thomas introduced members of the Danish West India Company to manioc as well as to arrowroot and sweet potatoes. Enslaved Arawak and Carib farmers in the West Indies managed two annual harvests of corn and manioc. In this same period, on Hispaniola (present-day Dominican Republic), the Spaniards shackled some 2 million aborigines and forced them to mine gold. Without opportunities to cultivate manioc fields, they survived on a starvation diet of beans and herbs.

Bernal Díaz del Castillo, a Spanish chronicler of Hernán de Cortés's conquest of Mexico, described manioc flour in the 1520s as an essential of shipboard staples because of its three-year shelf life and resistance to weevils. To ensure supplies, the Spanish accepted manioc tubers and bread from the Taíno as taxes.

After Portuguese settlers encountered manioc in Brazil in the 1530s, the tuber bolstered New World cuisine with a substitute for European wheat, which required a drier climate and six times more ground for planting than manioc. The Spanish elite demeaned the vegetables as pagan, but, in 1539, explorer Hernando de Soto accepted manioc as a portable form of nutrition for his military expedition from Cuba into Florida and the American South. In the 1660s, laborers for the French West India Company on Martinique renewed past croplands by piercing each manioc mound with digging sticks and inserting manioc cuttings. Bread makers dried and cooked the tubers into loaves on inch-thick clay griddles.

Africa

In the late 1600s, at the same time that nutritionists studied the chemical properties of manioc grown in London's Chelsea Physic Garden, Portuguese traders introduced the tuber to Angola and the Congo. Traditional foodways slowly admitted manioc to the staple crops of bananas, millet, and yams. By 1650, after losing their familiar food crops to baboons, drought, and locusts, the Bushongo accepted manioc as a source of meal for bread. East of the Zambezi River, the Southern Lunda depended on manioc as their staple carbohydrate, which Scots missionary David Livingstone called the native "staff of life."

While European colonists established the tuber as a source of silage for livestock, manioc remained a staple of native cuisine centered on the Gulf of Guinea and was familiarly known as *foufou*, a pounded paste. For homeless people, common custom in Madagascar allowed the poor to chop pieces of sweet manioc in the field to munch like raw turnip. In 1739, the tuber became slave food at Réunion after the governor introduced the tuber as a continuous monoculture.

In 1786, vegetable dissemination passed the tuber and its tasty foliage from Mauritius and Madagascar to India. For former slaves who founded Freetown, Sierra Leone, on March 11, 1792, the flexibility of manioc cookery extended its use to boiling, frying, grating, liquefying, pureeing, roasting, and stewing and fermenting into beer. Domesticated in 40 countries, in the 1800s, manioc became Africa's primary food.

Manioc in Modern Times

English naturalist Charles Darwin found widespread cultivation of manioc in April 1832 in Chile, where its leaves enriched the soil as green manure. In Brazil and on Floreana Island off Peru, he ate *farinha* (manioc bread), which natives made from pounded roots. In Mozambique in 1893, the Portuguese Nyassa Company headquartered at Porto Amélia (present-day Pemba) and began developing commerce between the Rovuma and Lurio rivers. Manganja women superintended manioc beds and dried the tubers to make porridge, the national dish. On arrival at East Africa, Norwegian missionaries adapted their waffle recipes to native manioc flour and buttermilk.

At the rate of more than 230 million tons (209 million metric tons) annually, manioc in China, Costa Rica, Ghana, Guyana, Indonesia, Nigeria, the Philippines, Thailand, and Vietnam fortifies the diet with calcium, iron, phosphorus, vitamin C, and zinc, but little protein or other micronutrients. It remains a common breakfast food in South America; in Ecuador, manioc-based drinks refresh consumers with their sweet, fruity taste. In the mid-1980s, northern Vietnamese farmers began a four-year swidden cycle with upland rice and concluded with manioc planting before returning to slash and burn methods to revitalize the soil. In the Philippines, the Hanunóo of southern Mindoro Island broadened their swidden cultivation with manioc as well as millet, papaya, and yams.

Today, manioc nourishes some 500 million people worldwide as farina, greens, tapioca, and fried strips comparable to french fried potatoes. Fermented manioc bread is a reliable pack food because it needs no refrigeration.

See also: Beer; Columbus, Christopher; French East India Company; Hybridization; Poisonous Foods.

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Maritime Trade Routes

Until the advent of railroads and airways in the mid-1800s, water routes for the food trade extended over time from rivers to sea-lanes, becoming the fastest intercontinental conveyance for edibles. The first maritime network, formed in 3000 B.C.E., carried dates, grain, and oil from Babylon in Mesopotamia southeast from the Euphrates and Tigris rivers. Planked keelboats traveled along the Arabian Gulf to the island of Bahrain and the Harappan culture on the Indus River to barter for sorghum and millet.

Ancient Food Trade

The beginning of spice trading around 1600 B.C.E. involved Egyptians, 90 percent of it at Alexandria, in larger cargo ventures. Freight masters carried oil and wine to central Africa and introduced the chicken to Tanzania. With the coronation of Hatshepsut as pharaoh in 1479 B.C.E., trading networks down the Red Sea to Punt (present-day Somalia and Eritrea) enriched Egypt with ebony, spices, and table aromatics. Exotic fare from Africa, India, and Malaysia turned Alexandria's harbor market into a world-class food bazaar.

Farther north, the Phoenicians (or Canaanites), the adventurers and cross-carriers (interharbor transporters) of the ancient world, traversed coastal waters and the Atlantic Ocean in cedar plank ships to trade honey, oil, and wine from Aleppo and Tyre to Cornwall, England. A Semitic merchant culture at Byblos, Sidon, and Tyre in present-day Lebanon, from 1200 to 333 B.C.E., Phoenicia bought and sold barley and wheat from Palestine and Syria and traded dates, figs, and pomegranates and salted eels, sturgeon, and tuna. The Phoenicians imported livestock and bags of grain and sea salt, chests of saffron, and cardoons, olives, olive oil, and wine from Egypt, Greece, Mesopotamia, Sardinia, Sicily, and the Atlantic coast of Iberia.

Around 1000 B.C.E., the Chinese paralleled Phoenician mercantilism with varied routes to cassia merchants in Southeast Asia. The arrival of the sweet potato from South America to Hawaii and Rapa Nui added a trade item to lure Chinese freighters eastward. Profitability increased during the Eastern Han dynasty at the

beginning of the current era from lengthy oceanic merchandizing from Hanoi and through the Strait of Malacca to Sri Lanka, India, the Persian Gulf, and Axum, the capital of Ethiopia on the Red Sea. Chinese traders also sailed east to the Solomon Islands to buy the meat of dolphins, pigs, sharks, and turtles.

Because sea transport outpaced overland hauling over desert or mountainous terrain, Athenian and Egyptian food dealers also preferred ships to caravans. Greek navigators, carrying oil, olives, and wine, outlined Mediterranean passages through the Dodecanese to Pontus, a source of caviar, fish, and grain on the Black Sea and the Sea of Azov. Greek explorers steered west toward Crete, Cyprus, Delos, and Magna Graecia, the Greek colonies in Sicily and lower Italy.

Farther south, from 250 B.C.E. to 250 C.E., Egyptian and Roman coasters dominated Red Sea routes to Ethiopia, Zanzibar in Africa, Mocha in southern Arabia, coastal India, the Dong Song Kingdom in Vietnam, and China. North Africa competed with Mediterranean grain depots by offering stocks of corn. For maximum income, the Romans exacted a 25 percent tax on such luxury imports as sea urchins.

By emulating Phoenician navigation systems, Italy's sea merchants cut the cost of shipping, as compared to land routes, by some 85 percent. A heavily traveled sea course carried routine grain deliveries from Egypt to the Roman warehouses of Ostia, which the Emperor Claudius expanded in 42 C.E. The harbor, originally plotted by Julius Caesar, enhanced food distribution up the Tiber River by limited draft vessels and barges.

Extending their reach to western India, Roman shippers traveled the Red Sea, calling at ports along the east coast of Africa and the southern tip of Arabia to load coconuts, drugs, rice, and sugar. The split of the empire into Western Rome and Byzantium resulted in 490 in commercial fragmentation. During the Dark Ages, sea trade in the waters of the Middle East declined until Arab caliphs cleared them of piracy, around 700, and restored corn routes from the Black Sea.

Medieval Freight Magnates

In the seventh and eighth centuries, the Chinese exploited travel to India via monsoon winds. At the Bay of Bengal, they bought coconuts, a popular

aphrodisiac. While caravans carried exotic foodstuffs—caraway, coriander, eggplant, figs, sugar beets, and wines—over land, the maneuverable seagoing junk, equipped with rotating sails, moved into the wind to carry bulk rice and tea to less profitable ports. Ships carrying cotton, pepper, sesame, wheat, and yellow beans connected Denzhou in eastern China with Korea and Japan by way of the Yellow Sea. To the south, Cantonese shippers crossed the South China Sea to reach the Malay Peninsula and Sumatra, a major depot for Indonesian cinnamon and cloves. By 850, Muscat dominated the trade route between Oman over the Sea of Oman and the Arabian Sea to India and Sri Lanka. From there, traders ventured over the spice route to the Strait of Malacca and north to Singapore.

Late medieval shipping, invigorated by the Hanseatic League, a twelfth-through sixteenth-century trade alliance in northern Europe, carried grain from Novgorod, Russia, southeast over the Baltic Sea through Riga and Danzig to Lübeck and Hamburg and over the North Sea to Bergen and Bruges. A thriving market in London, home to 100,000 in 1299, retailed 27,000 tons (24,500 metric tons) of beer and grain, much of it from Lübeck. London maintained its end of the trade by dispatching grain and sheep. Up the Scots coast, Newcastle markets reciprocated with wood for cooking and heating. Flanders shippers quickly broke cargoes of grocery staples from Ireland into small deliveries for Bruges, Ghent, and Ypres in Belgium, which had populations of more than 150,000 before the Black Death of 1348.

Simultaneously, Varangian and Viking voyagers carried dried cod and mead from Russia and Scandinavia as far as Byzantium. The wealth pouring in from Arabian herbs, opium, and spices arriving from Jeddah and sugar from Iberia to Mediterranean ports elevated Genoa and Venice to city-states. Venice, the queen of the Mediterranean trading routes, distributed goods to Bruges and Flanders, to ports north of the Danube River delta, and along the Rhine River to Augsburg and Cologne.

The fullest late medieval account of ocean routes comes from *Tuhfat al-Nuzzar fi Ghara'ib al-Amsar wa'Ajaib al'Asfar* (*On Curiosities of Cities and Wonders of Travel*, 1354), a travelogue by Moroccan cleric and traveler Ibn Battuta. Among his perusals of world shipping, he appended a lengthy description of the Chinese junk, which he admired for its adaptability to varied oceanic conditions. In 1405, Ming Emperor Zhu Di replaced fishing fleets with a flotilla of 300 ships crewed

by 27,000 sailors, who explored food markets over 35,000 miles (56,000 kilometers) in Arabia, India, Malaysia, and Mogadishu, Somalia.

In 1497, five years after Christopher Columbus pioneered a route to the New World, long-distance navigator and colonizer Vasco da Gama of Sines, Portugal, made short hops to Cape Verde in the Atlantic Ocean and longer voyages to eastern South America. He veered east around the Cape of Good Hope to Mozambique to provision his fleet with fresh vegetables and water. In Calicut, India, he tested barter with vegetarian Hindus and learned by trial and error why they rejected beef. He returned via Malindi (present-day Mombasa, Kenya) to Lisbon in July 1499 with cinnamon, citrus fruit, cloves, dates, melons, dairy products, palm wine, and rice. On the route back to Iberia around South Africa, his men paid the price of lengthy sea journeys in shipboard deaths from scurvy and tuberculosis.

The Race for Speed

The Dutch revolutionized maritime trade with the fly-boat, a merchantman that carried 20 percent more cargo with a 30 percent smaller crew. The competitive fleet conveyed corn, salt, and sugar as well as Baltic grain. From 1550 to 1610, increased commerce in Ionian currants, nutmeg, pepper, rye and wheat, and salt fish boosted Antwerp to a major player along shipping lanes from Asia to England and the Baltics. Increasing demand and raising prices to the south, crop failures in Italy heightened the need for rapid navigation via the shortest routes to such dependent overpopulated cities as Genoa and Livorno. In Venice, importers registered grain at warehouses in Rialto and San Marco and sold it directly to traders, who dispatched outgoing ships to North Africa and the Levant with anchovies and olive oil.

By 1620, despite high insurance rates to offset pirate raids, global shippers conveyed an annual load of 3,500 tons (3,200 metric tons) of pepper, 245 tons (222 metric tons) of cloves, 225 tons (204 metric tons) of nutmeg, and 90 tons (82 metric tons) of mace. For laborers, Venetian docks employed some 5,000 Greeks as sailors and overseers. Grocers' prices remained so high that even the loss of merchantmen from the Indian Ocean around Africa's Cape Horn failed to dent

the profits on the spice trade. Foodstuffs—fish from Newfoundland, cotton and molasses from Virginia, sugar and rum from Cuba and Hispaniola, cocoa from Mexico—redirected investments from Old World fleets to deep-sea vessels servicing New World shores. Competition from English merchant fleets and international wars drove small Asia-based colonial companies out of business, including, in 1799, the Dutch East India Company.

From the late 1770s to 1869, captains of hydrodynamically efficient clipper ships sped global food distribution by navigating courses along parallel ocean currents and trade winds. They made the most of expenditures for men and craft by carrying coffee, spices, and tea from Canton and Java around Cape Horn and across the Atlantic and by returning with American apples and ice slabs cut from ponds and packed in straw. After 1813, steady traffic along sea-lanes from Peru and the West Indies to Honolulu provided Andalusian horticulturist Francisco de Paula Marín with 65 fruit, nut, and vegetable seeds and slips that turned Hawaii into a food paradise.

Sea-to-sea freighting to the California goldfields during the 1849 gold rush transported food staples, building supplies, and whiskey and laudanum via steamer around the Four Evangelists at Tierra del Fuego, the dividing point between Atlantic and Pacific. Up the South American coast, traders made for the Pacific hub at San Francisco to load gold dust and coins. Other perishables, particularly coffee, rice, and tea, traveled Pacific sea-lanes from Australia, China, the East Indies, and Hawaii to Portland, Seattle, and the California shore. By 1880, American vessels dominated the maritime food and fuel trade.

Modern Shipping

Since the opening of the Panama Canal in August 1914, oceangoing vessels have ringed the world with cheap, dependable, and speedy food delivery. The evening out of distribution from have to have-not nations has simplified famine and emergency relief and lowered the death rate from spoiled food and starvation, a looming disaster following two world wars.

In the latter 1970s, when South Korea emerged as a commercial power, Japanese and American cargo liners traveled at 12 knots, and smaller tramp

steamers traveled at 10 knots. Through the improvements to food packaging and ship technology, major companies competed directly with air freight for regular contracts based on speed, sanitation, and efficiency. Gantry cranes and derricks maneuvered unit loads—bananas, bulk grain, champagne, copra, poppy seeds, rapeseed, shrimp, tea, tilapia, and wheat—directly into holds. Tankers loaded linseed, molasses, potable water, soybeans, vegetable oil, and wine by hose directly from storage tanks on shore. The replacement of individual casks and bottles for syrups and vinegars lowered cost due to breakage from cargo shifting. Reefers (refrigerated ships) sped dairy products and vegetables from holds and tweendecks directly to food suppliers in small harbor towns.

Improvements in containerized freight refrigerated with liquid nitrogen or dry ice allowed machinery to do the tedious work once relegated to longshoremen, who previously stacked case goods on hand trucks for rolling up gangways to pallets. Self-loading conveyor belts, both covered and open-air, reduced the chance of human error from fatigue and overheating in airless holds. Reduction of time in marine humidity ensured the freshness of coffee beans and prevented the clumping of granular salt and sugar.

During the shipping boom of 2004, specialized vessels increased the profits for investors in the food trade and enhanced the market for crews and ships. As economist Adam Smith explained in *The Wealth of Nations* (1776), the key to merchandising is transport. To guarantee the safe arrival of lobster and shrimp, seafood vessels backed up refrigerated units with their own chillers and compressors. For difficult navigation in island clusters and among reefs, larger vessels off-loaded goods broken down into smaller batches for coasters to deliver to wharfs, such as the harbor wharf/farmer's market at St. Bart's and through the choke point between India and Sri Lanka on the Palk Strait. Quicker intermodal passage from shore to hold slashed losses from defrosted meats from Sydney, Australia, and limited travel damage to blood oranges and tomatoes from Haifa, Israel.

See also: Australian Food Trade; Clipper Ships; Ibn Battuta; Sanitation; Trade Routes; Trading Vessels; World Trade.

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Markets and Marketing

The methods and strategies of food marketers determine how companies develop interest in new or obscure products and regenerate enthusiasm for flagging commodities. To create a reciprocal exchange—satisfaction in consumers and profits for companies—marketing begins with research into the reception of diversity in traditional cuisine, such as Crisco to Southern cooks, instant coffee to the French, and Kentucky Fried Chicken in the seafood-rich diet of Bermudans. Once a company targets a prospect, the details of how to package, transport, and present an unfamiliar foodstuff require additional analysis, such as how to distribute Greek yogurt in Bali and whether to post billboards to advertise feta cheese in South Africa. Individual obstacles require understanding of social patterns, as in explaining the convenience of a self-service cafeteria or the etiquette of eating blood oranges, popcorn, shish kebab, sushi, and tacos.

Historically, the media familiarized shoppers with new products, connecting canned milk, cod liver oil, and iceberg lettuce with nutritional advances and Quaker Instant Oats with the grandfatherly figure of the Quaker on the box. In 1693, John Dunton's *The Ladies' Mercury* offered Englishwomen a site that answered questions about foods with a personalized reply. The Q&A set a standard still popular in women's magazines and newspapers.

In 1843, Eliza Leslie of Philadelphia, the food maven of *Miss Leslie's Magazine*, applied the individual approach to consumer queries. Also in Philadelphia, writer

Finley Acker's *Table Talk* magazine offered consumer advice in 1886 by championing packaged biscuits and brand names—Baker's Cocoa, Pettijohn's Breakfast Food, and Purity Dried Fruit. Author Sarah Tyson Rorer contributed food articles to *Table Talk* that endorsed Fleischmann's yeast cakes and Niagara corn starch, a tasteless thickening agent for gravy.

After 1912, American home economist Christine Frederick, a champion of female consumerism, established the League of Advertising Women to identify and squelch false advertising claims, especially those directed at new mothers by Heinz, Nestlé, and von Liebig. Frederick wrote a column for *Ladies' Home Journal* that introduced consumers to processed foods, notably Fry's Premium Cocoa, a source of quick energy and warmth for Canadians. In 1913, the British Commercial Gas Association hired Maud Brereton to promote gas as a cooking fuel through store demonstrations and free recipe pamphlets. Because women tended to trust female advertisers, marketing became a lucrative field for female writers.

In 1930, full-page ads in *Good Housekeeping* presented photos of actual salesmen and customer testimony about worthy products, notably Birds Eye frozen fish fillets and home canning in glass jars processed in a pressure cooker. Detailed journal recipes initiated the success of rotisserie chicken and Toll House chocolate chip cookies. Radio broadcasts glorified processed foods as necessities for the busy housewife, for example, canned pineapple rings for fruit salads, condensed soups as bases for meat and vegetable combinations, peanut butter as a quick and easy sandwich filler for bag lunches, and Reddi-wip aerosol whipped cream.

Exemplary figures in food marketing indicated the need for innovation and psychological assessment of consumers, such as American engineer Lillian Gilbreth's 1945 studies of pantry needs for disabled and elderly cooks. Gilbreth focused on ingredients for such ordinary meals as meat loaf with mashed potatoes and green salad and chocolate pudding for dessert. In 1948, J.I. Rodale's *Prevention* magazine issued testimonials for the organic diet, which he elevated to a food cult. Euell Gibbons's *Stalking the Wild Asparagus* (1962), which advocated foraging for greens and herbs, preceded his 1974 commercials for Grape-Nuts, a natural food cereal. In 1963, Julia Child showcased French utensils and Mediterranean foodstuffs on *The French Chef*, a televised cooking

demonstration on Boston's WGBH that survived in syndication into 2010.

Television advertising, especially programs geared to children, came under the scrutiny of the Center for Science in the Public Interest (CSPI). In 1971, the nonprofit organization examined televised marketing of controlled substances, shoddy nutrition, and unhealthful foods. To promote sensible diet and physical activity, advisers analyzed the impact of films, magazines, sporting events, television advertising, and toy and video games on the rising obesity rate among American children. Because half of the 65 television ads that children see daily relate to food, the CSPI warned of misleading persuasive techniques for the K-3 range. The most insidious marketing for caffeinated drinks, low-nutrition beverages, salty snacks, and sweetened cereals lured children with coupons, games, toys, and trading cards, incentives that avoided the issue of quality choices for growing bodies. More troubling to analysts, the hyping of empty calories on school buses and in textbooks and in-school television promoted false logic about the elements of wholesome meals.

In 1989, the World Fair Trade Organization promoted food production and unbiased trading conditions in 70 developing nations in Africa, Asia, and Latin America by giving isolated growers access to the global market. The effort boosted sales of bananas, chocolate, coffee, honey, sugar, tea, and wine planted, harvested, or produced by poor farmers and workers. In 2010, according to *The New York Times*, sales of fair-trade foods reached \$1.3 billion in the United States, or 22.4 percent of global food sales. Seventy percent of fair-trade marketing involves coffee and coffee products.

Electronic advancement after the 1980s skewed food-marketing maneuvers from billboards and print copy toward the home computer. *Better Homes and Gardens* expanded marketing ploys with *The Healthy Cooking CD Cookbook* (2000) on CD-ROM. Early-twenty-first-century food marketing favors pop-up ads that demand the attention of Internet users, particularly those looking for diet pills or skimming recipes. In November 2011, the Australian Food and Grocery Council pushed for a ban on cartoons, e-mail, Internet sites, and pay television ads that promote junk food.

See also: Adulterated Food; African Food Trade; Agribusiness; Fast Food; Mail-Order Food; Maritime Trade Routes; Marshall, Agnes; McDonald's; Packaging;

Street Food; Supermarkets; Trading Vessels; World Trade.

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[Marshall, Agnes \(1855-1905\)](#)

An eclectic British caterer and author, Agnes Bertha Smith Marshall gained fame as an authority on elegant European cookery and fancy ices and as a diversified cooking entrepreneur.

Marshall was born at Walthamstow, Essex, on August 24, 1855. Educated in the Cordon Bleu style in haute cuisine, she expressed contempt for unsanitary railroad cafés, street snacks, and canned food. To upgrade common tables, she introduced the English to the ornate glories of French chef Auguste Escoffier that adorned the tables of assemblies and receptions. To heighten sensual pleasure, she devised savory pairings—chestnut with citron, tangerine with rum, and banana with citrus fruits.

As an entrepreneur, Marshall prepared women for cooking in aristocratic kitchens and enabled middle-class wives to build reputations for fine cooking. She marketed cast-iron kitchenware, cutlery, and utensils, such as the caramel cutter, chafing dish, duck crusher, forcing bag, ice breaker, raisin seeder, and saccharometer (for testing the degree of sweetness). On Regent Street in London, she demonstrated culinary techniques for up to 600 including the shaping of chicken, egg, ham, onion, and tongue into breakfast cutlets and the larding of an Easter rabbit with bacon. Her instant freezing of ice cream at the table with liquid nitrogen astonished diners.

Among the foodstuffs that Marshall sold at her residential showroom, baking

powder, curry, flavorings, food dye and fragrances, fruit liqueurs, leaf gelatin, and vinegars established her expertise in quality goods. She distributed coralline pepper, refined sugar, and Luxette, her brand of fish canapé spread for hors d'oeuvres and picnics. Her 1,000 tin molds turned out frozen bombes (frozen semi-spherical desserts), sorbets, and soufflés in geometric shapes and imitations of fish and swans, flowers and leaves, fruit, grain shocks, horseshoes, nuts, shells, and vegetables, such as artichokes, asparagus, and cauliflower.

Marshall turned food preparation into a successful conglomerate. From operating a domestic staffing registry, she extended her investment to a culinary institute, the Mortimer Street School of Cookery in London, which earned £880 from her first 40 pupils. From 10:30 a.m. to 4 p.m., she taught classes to mold such dishes as a beef and mushroom mélange for serving with piped mashed potatoes. She employed a military colonel retired from a posting in India to demonstrate curry making. Marshall garnished her masterworks with flowers made from colored gels, egg, and foie gras. Her students traveled to special events to perform and won a silver medal at the 1885 exposition in Antwerp, Belgium, for their display. In addition, she stocked a warehouse with domestic ice caves, freezers, refrigerators, and jelly bags, all her own inventions. Her lace paper doilies and ice cups simplified serving of and cleaning dishes for such specialties as custards and *crème panachée*, her version of a three-layered Neapolitan ice cream cake.

Also in 1885, Marshall published *Ices Plain and Fancy: The Book of Ices*, followed in 1894 by *Fancy Ices*, both illustrated with line drawings and recipes. In addition, she edited a weekly magazine, *The Table* (1886–1905), which published new recipes and menus and offered prize competitions to caterers, hoteliers, and housewives in Britain, the colonies, and the United States. She also shaped ground almonds into an ice cream cone, which she called “cornet à la crème.” Her editorials encouraged the training and social respect of kitchen staff. Her *Mrs. A.B. Marshall's Cookery Book* (1888) became a best seller.

The Martha Stewart of her day, Agnes Marshall was a forerunner of the modern television chef and domestic entrepreneur. Before her death at Brighton on July 29, 1905, following a fall from a horse, she took her table ideas on tour to the United States. For her contribution to chilled desserts, she earned the sobriquet “Queen of Cream.”

See also: Escoffier, Georges Auguste; Ice Cream.

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McDonald's

An American food service phenomenon, McDonald's has impacted eating styles, family relationships, and foreign impressions of U.S. capitalism. In 1940, brothers Maurice James and Richard James McDonald opened the anchor restaurant in San Bernardino, California. After launching a franchising effort in 1953, they allied with Ray Kroc, a milkshake machine seller from Chicago. Eight years later, Kroc bought out the brothers and began building the McDonald's empire into a world presence. He intended to overcome the kickback and corruption of the 1950s that he had observed firsthand at Tastee Freez.

A factory system of ingredient purchase and storage, preparation, portion size, and cooking times preceded the standardizing of customer service to a wait of less than five minutes for food and drink. In addition to family-oriented presentation, Kroc made available water fountains and clean restrooms at all franchise locations. Beginning with burgers, fries, and cola, the menu expanded to chicken, breakfast items, desserts, salads, wraps, and fruit smoothies.

Kroc invested in television advertisement and roadside recognition. Paired golden arches implanted along highways and city streets the *M* of McDonald's against a cheerful red rectangle. The public relations gimmicks of on-site

playgrounds, toys in Happy Meals, and a company clown, Ronald McDonald, entertained children at birthday parties and introduced the concept of the Ronald McDonald House, a charity directed at the health and treatment of sick children worldwide.

After 1990, when the company announced a switch from frying french fries in beef fat to all-vegetable oil, religious ascetics and other vegetarians patronized the restaurants to eat what they thought were fries untainted by animal fats. When editors of *India West* newspaper revealed McDonald's duplicity in April 2001, Hindus raged at misrepresentation that violated the ethics of vegetarians. On May 1, 2001, Hindu attorney Harish Bharti and others in Lynnwood and Seattle, Washington, filed a class-action suit against the McDonald's fast-food chain in the state as well as in California and British Columbia. Joined by Jewish, Muslim, and Sikh groups, Bharti charged false advertisement that desecrated holy norms.

In India, protesters smashed McDonald's restaurant windows; Hindu politicians demanded that the government oust the chain. Company official Walt Riker denied the charge of fraud and declared that french fries sold in India and Fiji were all vegetable. He added that the franchise never publicized itself as a vegetarian restaurant. The company requited the claims in 2005 with checks ranging from \$50,000 to \$1.4 million.

Late-twentieth-century furor targeted the iconic fast-food chain with a multitude of ethical violations. Protesters pictured the corporation as a promoter of child obesity and underage labor and a torturer of animals. Greenpeace claimed that the conglomerate denuded world rain forests and tribal lands for growing soybeans and creating pastures for raising beef cattle. As franchises opened in 119 countries, grassroots efforts blamed American fast food for destabilizing family mealtime and for spreading litter from milkshake cups and burger wrappers.

The combined assault of Erich Schlosser's *Fast Food Nation: The Dark Side of the All-American Meal* (2001), Morgan Spurlock's *Super Size Me* (2004), and Scott Ingram's *Want Fries with That? Obesity and the Supersizing of America* (2005) slowed corporate growth. Company officials fought back by balancing fast foods with vegetarian meals, abandoning polystyrene clamshell boxes, recycling cooking oil for diesel engines, promoting bioplastics, pumping syrup directly into

underground cola tanks, and building new locations from recycled fiberboard and glass.

See also: Fast Food; Slow Food; Vegetarianism.

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[Médici, Catherine de' \(1519-1589\)](#)

As a royal bride, Catherine de' Médici introduced Tuscan cuisine to the French in the sixteenth century.

The daughter of Lorenzo II de' Médici, Duke of Urbino, and Madeleine de La Tour d'Auvergne and the niece of Pope Leo X and Pope Clement VII, she was born in Florence, the cultural core of Renaissance Italy and the center of Médici family influence. She lost both parents in infancy and passed to the care of aunts and nuns. Training at the papal court sparked her worldliness and sophisticated manners.

After her engagement to King Henry II of France at age 14, she traveled to her new home on September 2, 1533, with a staff of Florentine *capi cuochi* (head chefs), confectioners, cupbearers, distillers, gardeners, pastry cooks, and waiters. An apocryphal story asserts that Canon Pietro Valeriano tucked into the princess's luggage a packet of *fagioli* (beans), the foundation of the Provençal cassoulet.

At Marseilles on October 28, 1533, Catherine's wedding banquet included two pasta entrées. The first, a savory version, was topped with cheese and meat

drippings. The second took the form of a dessert pasta flavored with butter, cinnamon, honey, saffron, and sugar. Henry treated her to grand posthunt feasts, for which chefs gilded and roasted whole beasts. Teams of waiters carried the kill to the head table on oversized platters.

Because Catherine's family were renowned Italian financiers who grew rich on trade in cloves, ginger, nutmeg, pepper, saffron, and salt, the French mocked her as "the grocer's daughter." Soon, however, they reevaluated her broad-mindedness about serious dining and health, such as the grilling of songbirds and the use of tobacco powder to cure headache.

After her coronation on June 10, 1549, at the Royal Abbey of Saint Denis, the city of Paris hosted a dinner in Catherine's honor featuring a floor covering of strewn herbs and service of four vegetables—artichokes, asparagus, broad beans, and peas—to accompany 24 bird and game entrées, an elitist snub of butcher's cuts. The meats included 132 boiled chickens, 99 pigeons and turtledoves, 90 spring chickens, 66 turkeys, 33 ducks and egrets, 33 goslings and herons, 33 hares and pheasants, 30 capons and kids, 30 peacocks, 21 swans, 13 geese and partridges, nine cranes, and three bustards.

Dining with Catherine

As queen, Catherine concealed her squat shape with corsets, high-heeled shoes, and hoop skirts. She superintended the provisioning and arming of the military as well as plans for the royal *villeggiatura*, the withdrawal of the royal family to rural estates to partake of more rustic fare. As a wife and mother of ten, she broke the pattern of court excess with sojourns in the countryside for fresh vegetables. In the style of her great-grandfather, Lorenzo the Magnificent, she grew and ate fruits and vegetables, planted new crops, and made cheese. She lavished attention on her most prominent sons, Francis II, Charles IX, and Henry III, engineered their marriages, and bolstered their reigns. Two of her daughters, Elizabeth and Margaret, became queens.

Widowhood at age 40, afforded Catherine power and luxury she had never before controlled and increased her impact on haute cuisine. She evicted the royal mistress, Diane de Poitiers, from Chenonceau Castle on the Loire and began

cultivating a splendid vegetable garden. During religious turmoil between Catholics and Huguenots in the 1570s, she elevated the Valois dynasty by patronizing the arts. At the Royal Palace at Fontainebleau, her dedication to humanistic advancement updated northern European cuisine and rid dining of its déclassé medievalism. Her cooks perfumed *choux* pastry, eclairs, gelati, and macaroons. At state fêtes, she introduced the carved goblet, Murano glassware, and the table fork to place settings of knives and spoons. The refined diner began carrying a personal fork along to soirees as a symbol of elegance and savoir faire.

Catherine's arrangement of dishes into courses pioneered an appreciation of foods as members of gustatory groupings. In place of mundane soup and stew, her staff arrayed continental specialties—aspic, candied vegetables, milkfed veal and liver, pasta, scaloppine—along with ices and ice cream, sherbet, and zabaglione for dessert. For the nuptial dinner of Charles IX and Elizabeth of Austria in 1570, Catherine's staff served two barrels of oysters, 1,000 pairs of frog legs, 400 herring, 200 crayfish, 68 carp, 50 pounds of whale meat, 28 salmon, 18 brill, and ten turbot, as well as platters of lobsters and mussels.

At the queen's direction, French gastronomy embraced *carabaccia* (onion soup), duck *à l'orange*, grated Parmesan cheese over gratins, guinea hens, heated hippocras (spiced wine) and the chilling of cordials and wine Roman style with ice or snow. Her name attached to artful dishes,

[Recipe: French Onion Soup](#)

Slice five white onions paper thin. Sauté them in butter in a covered saucepan. Boil the onions in 3 cups of boiling water or beef stock for one-half hour with one bay leaf. Crumble three slices of stale French bread into the mixture. Top with 1/2 cup of grated Gruyère, 1 tablespoon of capers, one chopped sprig of thyme, sea salt, pepper, and a sprinkle of red wine vinegar.

such as steak à la Médici, a slice of beef adorned with artichoke heart, carrots and peas, tomatoes, and turnips.

Table Art

Catherine valued the look of food on its way from kitchen to table to plate. In the formal dining rooms at the Tuile-ries palace, she preferred elegant Limoges and Wedgwood place settings, silverware, and embroidered linens. Her entertainments paired feasting with ballets and masques. For variety, she balanced sumptuous court meals with picnics.

The French embraced artichokes, her favorite food, as the latest fad vegetable and declared it an aphrodisiac. Her menus featured asparagus, baby peas, broccoli, cardoons, cucumbers, custard, marmalade, melon seeds, mushrooms, parsley, quenelles of poultry, spinach, sweetbreads, and truffles. In 1564, morning banquets at her ornamental dairies at Fontainebleau and outside Paris at Saint-Maur symbolized respect for bucolic values, fertility, and motherhood as well as a love of French soil.

In a return to the splendor of the court of Francis I, the queen's extravagance demanded huge expenditures to support a court of 10,000. The progress from one palace to another relieved her home district of food shortages and placed new demands on other dairies, hunting grounds, orchards, and produce farms. Staffing required appointments of bread waiters and spit turners. Meat carvers introduced tournedos of beef, a new take on the cutting and arrangement of meat on a plate. When court jealousies raised questions of safety, she added a food taster to her personal staff.

Although gout, migraines, and toothache ended her late-in-life food debauchery with a limited regimen of pureed foods, her style found favor with her nephew, Henry IV. Catherine cast new light on food complements, particularly the separation of salted entrées from sweet desserts and the service of eggs Florentine over sautéed spinach and topped with mornay sauce. With the addition of broth, extracts, garlic and onion, herbs and spices, and sauces, French gastronomy reached a height in the grandeur and profusion of Louis XIV's table at Versailles. European restaurants continue to display portraits of Catherine de' Médici, the Florentine gourmand.

See also: Aphrodisiacs; Beans and Legumes; Feasting; French Diet and Cuisine; Grilling; Ice; Pan-European Diet and Cuisine; Shellfish; Symbolism, Food.

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Medieval Diet and Cuisine

From 400 to 1400 C.E., the tastes of the Middle Ages bore historical significance as the first period cuisine reported in Arabic, British, Catalan, French, Italian, Mongolian, Polish, and Spanish sources. For information on the cultivation of plants, honey, and pond fish for the table, farmers turned to the Latin masters—Cato, Columella, Crescentius, Palladius, Varro, and Virgil—whose opinions held sway over agriculture, apiculture, and pisciculture during the first millennium C.E.

In illumination and text, scrolls revealed the stirring of barley and wheat into coarse gruel, an inelegant staple perpetuated from ancient Rome into the Dark Ages. Additional pictorial proof of lively food chores derives from tapestry, which captures the daily activities of communal ovens, farmer's markets, kitchens, and pantries. Because Catholic monks from Egypt to Ireland dominated period scriptoria and scholarship, their libraries contained up-to-date evidence of kitchen uses of such daily fare as cabbage and fava beans and chamomile and sage for remedies and wellness.

Religion and Medieval Customs

Eastern Orthodox and Roman Catholic prelates condemned a meat-and wine-rich diet for its association with social prominence and wealth. They advocated sacred self-control at table. After concurrence by St. Jerome and St. John Chrysostom in the fourth century C.E., the monastic hierarchy vilified alcohol and red meat as sins of the flesh. Around 515, St. Benedict the Great of Nursia, Italy, the fount of

Christian hospitality, denounced food extremes that violated vows of poverty and that encouraged drunkenness, gambling, and licentious behavior.

On meatless days, the Benedictines followed a regimen of eggs, frogs, smelts, snails, and unborn rabbits, which were technically considered undeveloped meat. Communion bread took on a mystic power for medieval Italian bakers, who marked loaves with religious symbols— crosses, stars, pentecostal flames—and the Chi-Rho, the first Greek letters of “Christos” (the anointed one). Bread baked on Good Friday remained on the kitchen shelf as a medicine to be grated into water as a panada, a thickened remedy for enteritis.

Christian restraints on food during the 40 days each of Advent, Lent, Epiphany, and Pentecost inspired clever ways of circumventing ecclesiastical law forbidding the consumption of butter, cheese, fat, meat, and milk. On meatless days, Irish children went house to house begging for the eggs that fasting families had not eaten. Cooks made food substitutions, such as fish roe baked in eggshells or in *soumada* (almond milk) to emulate a meat dish. The daring cook extended the definition of *seafood* to include coastal geese and puffins.

Medieval wall art features Cistercian monks stoking the hearth, an embodiment of the Benedictine rule requiring daily cookery and domestic chores that welcomed wayfarers to warmth and a hearty meal. For the suppression of gluttony and sexual debauchery, religious houses relied on monk’s pepper (*Vitex agnus castus*), a gastronomic antidote to natural reproductive urges.



A medieval lord dines on the bounty of his estate, prepared and served by a large staff. In feudal Europe, the laboring classes produced their own carbohydrate-rich foods and ate few of the meats and delicacies enjoyed by the wealthy. (*North Wind Picture Archives/Associated Press*)

For the sick and weary, monasteries stocked kitchen restoratives derived from curative herbs and vegetables grown in the physic garden. In the late 500s at Lake Zurich, Switzerland, evangelist St. Gall raised 16 beds of cabbage, chard, garlic, leeks, lettuce, onions, parsnips, radishes, shallots, and watercress for the daily pottage, a vegetable ragout. Although low in fat and high in fiber, such medieval peasant fare lacked protein as well as vitamins A, C, and D.

Exchange and Experimentation

The elegant bounty of Persian cuisine influenced cookery in India and Turkey and spread flavored pilaus to the royal courts of medieval Europe. After William the Conqueror seized Saxon England for Normandy in fall 1066, the average yeoman gained a broader view of sophisticated cuisine. Because of the

subsequent Crusades in the Holy Lands, the Middle Ages experienced the swap of advanced agriculture and produce, including Lombardy chestnuts, Maltese figs, and Syrian raisins and sugarcane.

Among German grain dealers in Lübeck in 1159, formation of the Hanseatic League by Henry the Lion of Saxony stabilized prices by evening out food gluts of salt perch and tuna and compensating for crop failures of rye and wheat. Harbor towns, which dominated food importation, developed reputations for mealtime exoticism— for example, the cinnamon, cloves, ginger, nutmeg, pepper, and saffron that Portuguese traders introduced in Lisbon and Porto.

Under the dominance of European Catholicism, Corsican, Iberian, Italian, and Provençal vineyards aged wine for the Eucharist. For good reason, medieval brewers fermented robust ales by building their vats next to bakeries. By reusing starter from successful batches, they preserved zesty beer with flavorful yeast that initiated microorganisms in the next batch. Both ale and wine supported a healthy trade among nations.

Food by Social Rank

In a broadly stratified society, workers packed a simple plowman's lunch of bread with cheese, a pickled vegetable, and perhaps a boiled egg. Increasing respect for community baking elevated the craft to municipal importance. The loss of a baker to accident or epidemic devastated villagers until a replacement trained for the job. The laboring classes raised pond fish and poultry and sold fresh plaice (flatfish) and eggs to the moneyed class. The rich lengthened the shelf life of their *garde mangers* (pantries) by excavating them underground. For home dining, commoners bartered daily for affordable supplies and consumed little produce from livestock. They ate legumes and rye crusts from wood bowls and filled their horn cups with water, cider, mead, or perry (fermented pear juice).

The affluent bourgeois supped on manchet (soft wheat loaves), pork, eel and lark pies, and the pheasants and venison field-dressed by hunters. From trained vines and espaliered fruit and nut trees along the sun-warmed stone walls of manses and abbeys, the gardeners of dukes and bishops ensured quality almonds, grapes, and peaches for baking tarts and for sweetening stuffed goose and other

complex dishes. As the focus of banquets, the carver turned into an art the slicing of meat into “gobbets” (bite-sized pieces). To avoid criticism by the Roman Catholic Church for such luxury foods as whole stuffed carp and suckling pig, the wealthy allowed the poor to carry off from late dinners and feasts the leftover sops and trenchers of bread, the flat surfaces that doubled as plates.

In a class-oriented hierarchy, the intermarriage of noble families introduced acculturation via international feasts, such as the three-day nuptial reception on May 12, 1192, for Richard I, the Lionheart, of England and Berengaria of Navarre. Hosts honored guests at Limassol, Cyprus, with platters of spiced hash meat, painted marzipan, sugared fruits, and taro, an unusual menu for an English wedding feast.

Discriminating Tastes

Influenced by the Greek physician Galen’s studies of the four body humors to cookery around 180 C.E., the medieval menu advanced nutrition and eating for health and longevity. The classic lore of curatives passed orally from one apothecary to another during apprenticeship, conveying such advice as the eating of pure white sugar to benefit the bladder, blood, chest, and kidneys. Additional gastronomic aid came from a balance of sweet with sour, as in vinegary meat sauces made from dates and currants.

Mediterranean savories teased the palate of late medieval gourmands. Based on Syrian cuisine, the contrast of sour with sweet required knowledge of vinegar and verjuice, an acidic flavoring pressed from unripe grapes or crab apples. Street vendors offered ready-to-eat condiments, including green sauce and garam masala, a preblended Indian spice. Monastic cooks studied Apicius, the Roman cookbook author, for advice on holiday specialties and the ladling of wassail (mulled cider) at Yule gatherings.

The issuance of nutritive standards by al-Majusi of Persia around 980, German abbess Hildegard of Bingen in 1152, and German philosopher Albertus Magnus in 1259 identified foods such as anise comfits (candy), wild bird brains, and turmeric that sustained strength and cured debility. Mustard helped quell the overwhelming brine of meat preserved in vinegar and salt and enlivened the

flavor of eels in gelatine. Gardening research offered solutions to failing appetite during rehabilitation and to infirmary dietetics for surgical patients and amputees, particularly soldiers recuperating from the Crusades. In Asia, Chinese herbalism expanded in the 1200s C.E. with Chia Ming's guidebook on dining well to stay healthy. Among the foods suspected of threatening health, authors listed cucumbers, melons, pumpkins, and raw pears, all considered difficult to digest.

A Stimulating Diet

After years of leaving home for manual toil unfed, workers began taking fresh-air snacks of barley beer and oatcakes for breakfast, elevating the day's intake from two meals to three. Chinese plowmen stopped work at midmorning for a meager repast of an onion bulb or garlic clove wrapped in unleavened flatbread. For Scandinavian artisans, meals of salt-fermented gravlax (buried salmon) presented a savory blend of dill and sugar in thin slices served on *flatbrød* (crackers) with capers and lemon. Crafters halted daily toil for "nuncheons," work breaks of cheese or mutton pasties (turnovers), which they could eat without utensils.

In contrast to foods readily available to commoners, upscale cookbooks revealed the profusion of dishes served to royalty and aristocrats. The recipes mentioned in Huou's three-volume 1330 survey of table delights enjoyed by Mongolian Emperor Kublai Khan indicated tastes for body-strengthening meats and produce delivered by caravan and junk to China's imperial chef.

In addition to titillating new flavors and aromas— asafetida, candied hazelnuts, pomegranates, and quince—food specialists throughout the late Middle Ages searched for the magic curative and libido enhancer, such as antler soup, composed of chopped stag antlers, gingerbread, honey, and wine. Moroccan traveler Ibn Battuta preferred coconuts as a stimulant to romance. Marco Polo reported that Chinese males courted women with bowls of fragrant Mandarin duck soup.

By the mid 1300s, as the liberality of the coming Renaissance defeated ignorance and superstition, diners achieved some choice in their food intake. At Krakow, Casimir II of Poland initiated urbanism by inviting German Jews to migrate east from the Rhineland, bringing with them ethnic cookery and

foodways. For variety, an icehouse provided the table with fish roe and seafood as well as fresh dairy products.

Period cooks added the chilling of steamed vegetables to lengthy rotisserie cooking and basting of meats at the hearth, a culinary technique described in detail in *Forme of Cury (Forms of Cookery, ca. 1390)*, compiled by the chef of Richard II. The salting of fish extended the shelf life of coastal goods to the provisioning of armies, press gangs, and ships' galleys. The era's sausage recipes preserved for winter the meat from livestock and equipped communities for famine during military siege. The increased use of ground almonds and almond milk and the importation of rice contributed a basis for the subtle tarts and sickroom capon blancmanges of the Renaissance.

See also: Charlemagne; Condiments; Crusaders' Diet and Cuisine; Feasting; Grilling; Huou; Maritime Trade Routes; Nuts and Seeds; Polo, Marco; Salad and Salad Bars; Taillevent; Trade Routes; Vegetarianism; Vinegar; Yeast.

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[Mediterranean Diet and Cuisine](#)

A model of healthful food choices and lifestyle, the Mediterranean diet and cuisine yields measurable improvements to wellness and longevity. From Roman times, families in Crete, Greece, Italy, the Levant, and Magna Graecia (Sicily and

southern Italy) burned charcoal in braziers, portable burners that also cooked spitted salmon, sardines, and herbed game and lamb. Diners dressed their salads with olive oil and lemon juice and consumed the entrée along with bread and honey, whole grains, legumes and vegetables, almonds and walnuts, and watered table wine.

Central to daily consumption, nuts and fruit— apricots, berries, dates, grapes, melons, olives, oranges, peaches, pears—added variety and roughage to bolster health. For Rome’s legionaries, a light ration of watered wine accompanied heavy consumption of bread and gruel made from barley, oats, spelt, and wheat. More complex recipes introduced wheat flatbread, barley cakes, and combinations of chickpeas and lentils, elements still favored in twenty-first-century Italian diet and cuisine.

Following World War II, American physiologist Ancel Benjamin Keys, the developer of K-rations for the U.S. military, researched cholesterol and coronary disease. From 1958 to 1964, he monitored results of the Seven Countries Study among 12,000 men in Finland, Greece, Holland, Italy, Japan, the United States, and Yugoslavia. The results indicated that Greeks and Italians promoted wellness by eating relatively large quantities of fresh produce and olive oil, while Americans and Finns courted heart disease, obesity, and stroke by smoking and eating butter, lard, and meat. The differences were reflected in heart attack rates among males in the 1960s: Greeks averaged 33 per 100,000, compared with 189—5.7 times as many—for U.S. men. Based on his findings, Keys campaigned for a reduction of saturated fat in the American intake by advocating the Mediterranean diet. With his wife, biochemist Margaret Haney Keys, he compiled *How to Eat Well and Stay Well the Mediterranean Way* (1975), a commentary on degenerative ills. The text identifies sources of omega-3 fatty acids, antioxidants, and fiber, the indigestible ingredients that promote thorough metabolism and beneficial flora in the gut. The text outlined shopping and cookery for educated families seeking longer untroubled lives.

A widely publicized examination of French eating habits in 1991 pointed to the health benefits deriving from the consumption of red wine, including lower incidence of cardiac disease than in countries that consume less animal fat—the French Paradox. The Oldways Preservation Trust, convened by the Harvard School of Public Health and the World Health Organization in January 1993,

championed the Mediterranean ideal of wholesome, satisfying fresh foods consumed in pleasurable company. In 1995, the Association for the Advancement of the Mediterranean Diet dispatched a diet bus to educate children in Catalonia and Valencia on the worth of regional eating styles.

Late in the 1990s, medical research linked antioxidants in the Mediterranean diet with positive physiological effects, including a reduction in diabetes, melanoma (skin cancer), and obesity. The traditional Mediterranean regimen stressed moderate consumption of cheese, eggs, and yogurt and daily intake of olive oil, a less inhibitive fat to the cardiovascular system than butter or lard. In a followup to the Keys fieldwork, nutritionist Walter Willett, on staff with Harvard University's School of Public Health, and Patrick J. Skerrett recommended restructuring the American diet in *Eat, Drink and Be Healthy: The Harvard Medical School Guide to Healthy Eating* (2001, 2005), which crusaded for evidence-based advice and weight control. Willett and Skerrett proposed that other heritage diets contain heart-healthy food combinations, such as Japanese and Latin American gastronomy.

Additional benefits from the Mediterranean model emerged from further research. Related suggestions ranged from regular exercise and less between-meal snacking on processed foods to slower eating of small portions of healthful foods, multi-course meals, and higher water intake, resulting in improved digestion and metabolism. Locavores and supporters of farmer's markets acclaimed abundant seasonal fruit and vegetables. Vegetarians approved Greek yogurt and the standard *macedoine de fruit* (mixed fruit) offered at the end of the meal rather than sugary desserts.

Subsequent kudos for the Mediterranean diet from the *American Journal of Epidemiology* and the Mayo Clinic in 2008 and 2009 announced reduced risk for Alzheimer's disease, breast cancer, and Parkinson's disease, in part owing to the lower intake of animal protein. Additional studies have linked the diet with protection from arthritis, asthma, autoimmune disease, gum disease, and hyperglycemia. In 2010, the United Nations Educational, Scientific and Cultural Organization (UNESCO) honored the Mediterranean dietary pattern as an integral element of Cretan, Greek, and southern Italian heritage.

See also: Egyptian Diet and Cuisine, Ancient; Greek Diet and Cuisine, Ancient;

Israeli Diet and Cuisine; Italian Diet and Cuisine; Maritime Trade Routes; Olives and Olive Oil; Pan-European Diet and Cuisine; Pasta; Roman Diet and Cuisine, Ancient; Theophrastus; Trade Routes; Trading Vessels.

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Mexican Diet and Cuisine

Mexican gastronomy exhibits a hybridization of ancient Mayan and medieval Aztec diet with Renaissance Spanish delicacies.

In pre-Columbian Mexico, after 7000 B.C.E., Mayan tastes preceded Aztec culinary developments with a corn-centric diet in the form of corn on the cob, dumplings, griddle cakes, and popcorn. Women prepared kernels by macerating them with stone rollers and mixing the results into a multipurpose paste. In addition to corn in bread and gruel, Mayans drank corn in *atole* (a hot beverage) and *posole*, a liquid gruel sweetened with honey. Pit roasting and barbecuing readied for the table deer, iguana, peccary, and turkey as well as armadillo, manatee, monkey, and tapir. Additional wild stocks of agave, fish, manioc, papaya, plums, prickly pear, *ramón* (breadnut) seeds, turtles, and yucca varied meals of garden produce.

Aztec Tradition

In central Mexico from the sixth century C.E., the Aztec of Tenochtitlán served indigenous species—algae, frogs and newts, tacos wrapped around live crickets, and roasted caiman or turkey as a specialty. Intercropping on *chinampas* (floating gardens) boosted corn yields with companion plantings of beans, a nitrogen fixer. Cultivation of wild herbs suppressed invasive insects and provided piquant flavorings for corn and bean dishes. Traditional kitchen work involved women in the daily five-hour processes of grinding of corn on a mano and metate (grinding stones), the toasting of corn cakes on *comals*, and the cooking of stews in a clay *olla*.

Upon the arrival of Hernán de Cortés, the conqueror of Aztec Mexico, on November 8, 1519, the Spanish snubbed Aztec staples—amaranth greens, chia seeds, custard apples, ground seeds and insects, jicama, maguey worms, nopal leaves, and quinoa—as primitive. Witness accounts of cannibalism on native altars attested to the Spanish revulsion of native ways; however, the soldiers readily adopted avocados, beans, corn, pineapples, squash, sweet potatoes, tomatoes, and tomatillos. They also relished foaming mugs of hot chocolate, spiced with chilies and vanilla. Conquistadors took the tamale recipe (chopped meat, vegetables, and cornmeal steamed in cornhusks) home to Spain as evidence of Aztec civilization.

Ibero-Mexican Fusion

The Amerindian foods of Mexico combined well with those of the Spanish and Portuguese. When Iberians colonized the land in the 1500s, they introduced domestic cattle, goats, oxen, sheep, and swine, leading to a significant change in local diets from vegetable to animal protein. Unlike native Puerto Ricans, whose population declined from epidemics and enslavement, Mexicans remained vigorous and open to the hybridization of table fare. Surviving are the unique dishes of indigenous Mixtec, Nahuatl, and Zapotec speakers—stewed *espirulina* (algae), mountain lion, roasted grasshoppers and quail, and venison meatballs—but they had little significance in the post-Columbian diet. By the late 1500s, farmers were planting wheat, which developed into a lucrative export throughout Caribbean military installations.



A mother and daughter present a sampling of regional food from Michoacán state in west-central Mexico. Regional differences in climate, geography, indigenous culture, and history contribute to a rich and diverse cooking heritage across the country. (Adalberto Rios Szalay/LatinContent/ Getty Images)

The new Mexican diet featured Spanish touches in the addition of almonds, cheese, cinnamon, citrus fruit, coffee, garlic, lettuce, nutmeg, olive oil, onions, parsley, rice, and wheat to dishes of beans, chicken, ostrich, and pork. The novelty of European fare precipitated a decline in indigenous cuisine. For the moneyed consumer, cattle herding in Sonora generated a surplus of fat, which replaced butter and olive oil in Spanish recipes for *carnitas* (roasted meats), tacos, tamales, and *tortas* (flatbread). Cane sugar gained a place in Mexican cuisine once dominated by honey and maguey sap. By the late 1500s, fruit farming balanced heavy entrées with the light touch of cherries, citrus fruit, figs, grapefruit, melons, and peaches. Nonetheless, poor Mexica clung to their traditional vegetarian diet as the only food they could afford.

Roman Catholicism imposed European foods for celebration. On Epiphany

each January 6, the devout served sweet yeast bread. For All Souls' Day on November 2, remembrances of the dead included empanadas, a Spanish meat turnover, and tamales, a national dish. The Spanish preference for sugar over honey at Christmas called for *buñuelos* (fried pastry) topped with sugar and served with fruit punch.

In 1699, the addition of sweet wine as a part of the Eucharist justified Dominican and Jesuit viticulture. In Baja, the source of 90 percent of Mexican wine, Spanish grape species provided a basis for sangria, a fruity Spanish table beverage. The abortive Mexican Empire of Maximilian I from 1864 to 1867 introduced barley beer, which evolved into a national staple alongside mescal and *pulque*, two alcoholic drinks fermented from maguey.

Postcolonial Fare

The collapse of colonialism and the rise of commercial coffee, cotton, sorghum, and sugar plantations for export left native peons in a poorer nutritional state than they had achieved before European conquest. Social inequalities between exacerbated chronic disease and high mortality rates for newborns. Those reduced to consumption of limited calories per day shared the hardship of Indians, Kenyans, and Vietnamese.

In 1980, under the *Sistema Alimentario Mexicano* (Mexican feeding system), the Mexican government directed food surpluses toward a fairer distribution. The Otomi of the Mezquital Valley created their own solution to poor nutrition by reviving ancient reliance on native greens. The Tarahumara of Copper Canyon continued to lose 70 percent of their offspring. From those who survived, they produced a race of runners from a meatless diet rich in chia seeds and *pinole* (trail mix).

Currently, Mexican fare features fresh, unprocessed ingredients in quantity, notably raw milk cheese and ceviche, seafood marinated in lime juice. Entrées slow-roasted in banana leaves or goat and pork grilled or fried in lard come to the table with guacamole, *pico de gallo*, and salsas made with cilantro, lime, onion, peppers, tomatoes, and tomatillos. Other *moles* (sauces) combine herbs and spices — chipotle, cinnamon, cumin, *epazote*, oregano—with chocolate, nuts, seeds, and

vegetables. Margaritas and other specialty drinks begin with tequila, made from the blue agave.

See also: Aztec Diet and Cuisine; Corn and Maize; Díaz, Bernal; Las Casas, Bartolomé de; Manioc; Peppers; Tex-Mex Diet and Cuisine; Tortillas.

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Middens

A garbage pile, shell mound, kitchen dump, or ritual heap, a midden provides archaeologists with data on past human habitations and seasonal campsites. Items open a window on daily life and diet as well as on the harvesting of food plants and animals, such as the predominance of sea mammals to the Inuit and the Greenland Norse; the mix of land and sea mammals in the diet at Nukdo, Korea; fresh water mussels along the Nile River in Egypt; palm fruit among Nubians of ancient Sudan; and hazelnuts in Mesolithic Colonsay, Scotland. Whether nomadic or sedentary, people rid their surroundings of unwanted or offensive materials, including clay pipes, medicine containers, fishhooks, rock fragments, unusable skins and animal dung, and human feces. From their storehouses and fires come charcoal, cooking rocks, nutshells and seashells, animal bones, the remains of pests and vermin, and broken grinding tools and pot shards, all evidence of the history and development of paleo-cuisine.

The study of refuse heaps began in the early twentieth century, notably with the amateur investigation by Captain George Comer, an Irish Canadian whaler in

Hudson's Bay. His two-year excavation of a Dorset culture dumpsite in Thule, Greenland, in 1916–1917 contributed to Arctic Eskimo ethnology. From subsequent studies of remnants of food preparation, specialists have determined the range of diet, nutritional deficiencies, and sophistication of cookery, preservation methods, and food storage among ancient peoples throughout the world.

Midden Sites and Dietary Evidence

People	Refuse Location	Time Period	Diet
Abenaki	Damariscotta River, Maine	50 C.E.	alewife, clam, cod, deer, eider, oyster, shad, and sturgeon
Aborigines	Hunter Island, Tasmania	4600 B.C.E.	abalone, albatross, crayfish, egg, fish, limpet, lizard, muttonbird, penguin, periwinkle, rat, and seal
Andamanese	Andaman, India	58,000 B.C.E.	fish, mangrove, oysters, rat, and wild pig
Ertebolle	Logstor, Denmark	5400 B.C.E.	cod, deer, dolphin, eel, ling, pike, raspberry, seal, shark, strawberry, whale, and whitefish
Homo sapiens	Klasies River, South Africa	118,000 B.C.E.	antelope, corms, limpet, penguin, roots, seal, whelk, and winkle
Huaca Prieta	Chicama Valley, Peru	3500 B.C.E.	bean, clam, crab, cucumber, fish, mussel, pepper, sea urchin, snail, and tomato
American Indians	Camp Bowie, Texas	750 C.E.	acorn, agave, bird, bison, camas bulb, deer, lechuguilla, rabbit, sotol, turtle, violet bulb, and wild onion
Innu	Port au Choix, Labrador	2900 B.C.E.	egg, fish, grass seed, mussel, narwhal, polar bear, seal, seaweed, sedge, sorrel, and walrus
Jomon	Natsushima, Japan	9000 B.C.E.	Asian bean, bird, clam, deer, dog, duck, oyster, and salmon
Lapita	Wairau Bar, Tahiti	1500 B.C.E.	dog, eagle, eel, kuri, moa, rat, shark, skate, sunfish, and swan
	Waiotahi,	1350	eel fern kumara lily moa mussel pigeon

Maori	New Zealand	1550 C.E.	eel, fern, kumara, mīy, moa, mussel, pigeon, pipi, sweet potato, and yam
Ohlone	Emeryville, California	500 C.E.	abalone, acorn, clam, cockle, duck, fish, goose, grass seed, mussel, otter, oyster, and whale
Timucua	Daytona Beach, Florida	2500 B.C.E.	clam, duck, mussel, oyster, seal, snail, tortoise, and turkey
Tlingit	Castle Hill, Alaska	3000 B.C.E.	buttersole, cod, duck, halibut, rat, rockfish, salmon, seal, sea lion, and walrus
Vedda	Pallemalala, Sri Lanka	4000 B.C.E.	buffalo, deer, hare, mollusk, monkey, mouse, tuna, and wild pig
Wathaurong	Victoria, Australia	23,000 B.C.E.	duck, fish, greens, murnong, possum, raspberry, wallaby, and yam

Nutritional analysis of a people's limited longevity and the results of malnutrition, such as the conditions of pellagra among the grain-fed Nubians of Sudan and scurvy among early Egyptians, helps to illuminate the limitations of ancient societies and explain their eventual overthrow or demise.

See also: Beef; Coprolites; Fertile Crescent Diet and Food Trade; Fish and Fishing; Hunter-Gatherers; Royal Greenland Trade Department; Shellfish.

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Milling

The world's oldest food industry—dating to Paleolithic times—milling, or the

separating of kernels from husks, increases the taste and digestibility of beans or grains for use in bread and porridge. Agrarian exploitation of grain began with the Nepalese and Sumerian cultivation of millet and wheat in 8000 B.C.E., the Andean sowing of quinoa near Lake Titicaca around 7000 B.C.E., and teff growing in Ethiopia from 4000 B.C.E. The grinding process advanced from the Latin American mano and metate (grinding stones), African mortar and pestle, and Egyptian saddle querns (concave grinding stones) to mills powered by dray animal, wind, water, steam, and gas and electricity.

In Babylon, Greece, India, Mycenae, the Sahel, Scandinavia, Sudan, and Turkey, the cumbersome nature of hand pounding and grinding with stones forced an end to nomadism and anchored farmers to one agrarian area, including the buckwheat-and rice-growing and milling areas of China, Indonesia, the Philippines, and Thailand. Like the Pueblo corn processing of the North American Great Basin, in the earliest era of acorn, barley, and oats refinement in England around 1050 B.C.E., hand-grinding dominated much of the homemaker's day, followed by sifting flour through hair or reed baskets.

Early Industry

In 500 B.C.E., Roman technology simplified the miller's job with slave-or animal-driven grinding of soft wheat that bakers sifted through linen. After the Roman invasion of Britain in 55 B.C.E., Britons in the Wey Valley of south-central England accepted the use of watermills as a shortcut to producing flour. As populations increased, growers sold their harvests to professional corn factors. Millers pulverized the kernels and distributed to bakeries three basic grades of flour—wholemeal (whole wheat), sifted brown, and sifted white. The highest grade produced the whitest, lightest bread, the food of the privileged. In Gaul in the 300s C.E., mechanized milling spread to Barbégal, where an aqueduct made snowmelt available year-round. Additional sites in Caesarea, Palestine; Leptis Magna, Libya; and Zama, Tunisia, applied Roman engineering to the problem of feeding growing populations. In the Christian era, monasteries operated mills, such as the tidal mill in Nendrum, Ireland, built in 619 C.E.

Medieval milling concentrated food control in the hands of the feudal squire.

In the eleventh century, English, Irish, Orkney, and Shetland millers adapted grinders to water and wind power, often retaining the original building on a manor as the distribution point of food supplies to serfs and yeomen. According to *The Domesday Book* (1086), England alone supported 6,000 milling operations. East Anglians experimented with harnessing wind power in brick and stone tower structures in 1180. Even with more complex flour industries, however, milling remained a family skill, passed from father to son.

The Miller's Job

Villages such as Murcia, Spain, promoted the construction of mills to ensure a supply of bread. Millwrights specialized in designing frames and hoists suited to individual locations. The miller also relied on the skills of the blacksmith, carpenter, cooper, and machinist, all of whom kept flour and meal production in operation. Additional skill in leathercraft maintained elevator belts that lifted barrels, tubs, and three-bushel sacks to the loft. Because river locations exposed grain and flour storage to perennial threat of flash flood, dam and weir builders deflected rushes of water.

Grooved millstones crushed kernels by pressure and friction generated by gravity. Two-stage systems also threshed stalks and sorted and removed chaff from grain. Each mill offered loft space for storage in the driest location of the unheated building. Millers kept cats or hired rat catchers to rid the garner of vermin. Another threat to milling, the fine dust generated by the mechanism could explode and set fire to wooden shafts and rotors. Depending on the quality of the millstones, each grain run generated stone particles in the product. Cloth or woven metal sieves and sifting reels separated the grit and bran. Patrons could choose to keep the bran in a product, called unbolted (unsieved) meal, and to retrieve the middlings (coarse particles) for cereal or grits. The process concluded with days of drying the flour to prevent souring and to hasten whitening. Unscrupulous millers enhanced natural bleaching by adding alum, ground bones, powdered chalk, and white lead.

At community facilities, millers contracted individually with growers and ground corn or grain to the required fineness in exchange for a percentage of the

flour and meal. The standard toll was 12.5 percent for corn and 16.7 percent for buckwheat, oats, rye, and wheat. In Louisiana, rice brokers determined the toll by bidding on the finished product.

Automation

In 1771, wheelwright Oliver Evans of Newport, Delaware, author of *The Young Mill-Wright & Miller's Guide* (1795) devised an automated water-powered gristmill on Red Clay Creek, where he charged 30 shillings to grind 100 bushels. Imitators of Evans's structure abandoned Dutch and German lava millstones and equipped their mills with French quartz millstones. Among Quakers, such as Amos and Mahlon Janney of Catoctin Creek, Virginia, and Isaiah Linton in Bucks County, Pennsylvania, mechanization encouraged merchant milling for profit and export at the standard rate of £196 per barrel. From 1803 to 1815, the Napoleonic Wars increased demand and doubled prices for milled goods. In Hungary, milling adapted in 1865 to a roller method, a gradual reduction of grain kernels through sequential applications of pressure. The use of rollers suited the region's hard wheat with a more labor-intensive method than those developed in France, England, and North America.

In the century between 1850 and 1950, American milling achieved a finer product by a shift of technology to metal and roller mills and by adding an air stream that blew chaff from kernels of corn, oats, soybeans, and wheat. U.S. food producers increased productivity and flour sanitation significantly, as mechanization accounted for an ever-increasing portion of milling labor—reaching 98.5 percent in 1950. Refinements enabled westerners to migrate over the frontier with flour that remained edible despite extremes of weather and open-air cookery. However, the loss of bran from the diet resulted in starchier, less elastic dough that caused intestinal fermentation, microbial growth, and flatulence as well as a decline in calcium, iron, and vitamins A and B1. Brown rice alone retained much of its lysine but lost some 80 percent of its thiamine and iron and further dropped in food value with washing before grinding. During the same period, Melbourne, Australia, acquired its first mechanized roller mill.

Post-World War I demand for rice and soy flour and meal produced a similar

milling boom in Borneo, China, India, Japan, Korea, and Thailand. Simultaneously, Minneapolis, Minnesota, became the world's grain processing center, earning it the name "mill city." Until a decline in the mid-1960s, Minneapolis's flour and meal traveled by barge and rail from warehouses to Canada and the Atlantic Coast and by ship to England and Wales.

A mid-1970s backlash against carbohydrate-rich flour products informed the public of the loss of nutrition and fiber in daily bread through milling. The media issued warnings about the addition of ascorbic acid and potassium bromate to replace natural aging and of chloride and peroxide bleaches that whitened the yellow grain endosperm. Synthetic vitamins, added to rice and wheat flour since World War II, alarmed artisanal baker Andrew Whitley, spokesman for the Real Bread Campaign. Public outcry demanded wholemeal grain, which some bakeries, such as Backhaus in Germany and Wheatberry in Massachusetts, milled in-house. By validating whole-kernel milling, food processors supported global tastes for brioche, ciabatta, focaccia, naan, pita, rice cakes, and whole grain pasta.

See also: Asian Food Trade; Bread; Cereal; Charlemagne; Einkorn Wheat; Industrial Food Processing; Linnaeus, Carolus; Olives and Olive Oil.

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[Monoculture](#)

From the beginning of farming and aquaculture, monoculture encouraged clear-cutting, heavy plowing, and soil compacting for the production of a single food crop or the stocking of ponds with one fish variety. Common to Central American cacti, New England orchardry, Hungarian vineyards, Jamaican sugarcane, North American soy, and Australian wheat fields, intensive monoculture simplifies the annual pattern of cultivation and harvest within one region's range of moisture and temperature, such as Washington State apples and Israeli blood oranges.

The one-plant philosophy unifies methods of irrigation and pest control by tailoring techniques to a single seed or tuber, particularly potatoes or yams. Seedlings emerge simultaneously; seed heads mature at the same time, yielding, for instance, a mass harvest of oats or a single crop of walnuts. All maintain a uniform size. For corn growers, weeds underfoot never reach enough height to infringe on corn stalks.

Similarly, the limiting of ponds to a common fish has served fresh water East German carp and Canadian rainbow trout and the milkfish raised in the brackish waters of the Philippines. Japanese pisciculture has flourished for centuries in the breeding of eel, sea bream, salmon, and yellowtail as well as growing seaweed such as nori. The focus on a single product reduces educational demands for farm labor and the need to equip a fishery with a variety of nets and weirs.

The reduction of biotic competition for nutrients and space ensures appropriate light and root room for plants and environmental controls for fish breeding. Large-scale monoculture yields one crop for harvesting and marketing, thus concentrating labor on the ramifications of a single task, such as threshing rice from chaff or netting edible tilapia from fingerlings. Farmers suffice on one type of machinery and a single method of storage in a barn or silo.

In the 1940s, plant geneticist Norman Ernest Borlaug introduced semidwarf, thick-stemmed wheat in Chapingo, Mexico, as a means of shortening growing seasons and boosting yield. Borlaug's experiment in the tropics and semitropics reduced crop disease. By introducing shuttle breeding, he encouraged double wheat seasons at different altitudes and latitudes. Thus, plantation monoculture reduced the need for importing grain and provided Mexican farmers with an export crop.

On the downside, one-crop systems leave farmers at the mercy of nature and

external forces, especially crop gluts, food fads, and wars. The liabilities of monoculture resound in serious crop failures, notably, the Irish Potato Famine of 1845–1848, a tragic period of starvation for the island’s peasants. A single fungus or pest, particularly stem rust in Kenyan and Ugandan wheat fields, can destroy an entire season’s crops and infest soil for years to come, as with nematodes in southeastern American tomato beds and gypsy moths in Moroccan plum trees.

The pursuit of a single crop forces the grower to rely more heavily on pesticides and fewer varieties of resistant strains, thereby raising the price of Silver Queen corn seed and Meyer lemons from China. Diners lose the diversity of heirloom Doorknob peppers and Arran potatoes. Children acclimate to predictable flavors and textures, such as McDonald’s french fries, made from the Russet Burbank potato. Foods grown in set parts of the country require more fuel for trucking to distribution centers. The fresh taste of local herbs and greens gives place to the tasteless head of commercially grown iceberg lettuce.

Current thinking favors mixed cropping for introducing varied legume seeds and heirloom edibles to truck farms. Crop diversity in cucumbers and strawberries increases sustainability and avoids the depletion of soil nutrients, a common occurrence in the production of corn and cotton. Deeper-rooted plants, including eggplant and tomatillos, stabilize soil, preventing erosion, and requiring less fertilizer. More economical use of cropland benefits the poor by lowering food prices, particularly the varied yields from Japanese rice beds.

For fish growers, full use of a pond requires varieties that feed on aquatic vegetation as well as aquatic insects and zooplankton. By stocking tilapia with catfish in a planted pond, the grower makes use of bottom gleaners and top feeders. This variety achieves population and weed control and produces a higher yield of edible meat. Taiwanese growers mix flora and fauna by cultivating seaweed with crab and shrimp, thus producing three times the harvest in comparison with that of monoculture.

See also: Famine; Fish and Fishing; Honey; Local Food Movement; Plant Disease and Prevention; Potatoes.

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Monosodium Glutamate

A controversial food additive, monosodium glutamate (MSG), an odorless crystal resembling table salt, accentuates natural flavors. The Romans turned the taste into a food fad by fermenting fish entrails and heads into *garum*, the era's popular condiment. The Japanese achieved a similar flavor boost from a broth of *Laminaria japonica*, a seaweed that contained natural glutamate.

First isolated in 1908 by Japanese chemist Kikunae Ikeda, MSG mimicked the savor of meat, a taste called *umami* (deliciousness). Manufacturers synthesized the salt from vegetables and peelings boiled in acid and neutralized in caustic soda. The taste, first marketed in 1909 by the Ajinomoto Company, enters the human diet in breast milk. It joins bitter, salty, sour, and sweet to form a quintet of human mouth responses to palatability.

As a culinary condiment sometimes identified as hydrolyzed vegetable protein, MSG gained regard in China and Korea as an excitotoxin, a stimulant to brain neurons. The U.S. Food and Drug Administration (FDA) cleared the additive for use in 1947 after testing the production of Ac'cent, a carbohydrate fermented by bacteria or yeast. MSG currently adds zest to bacon, jerky, and sausage; barbecue, chili, spaghetti, soy, and Worcestershire sauces; beer and other beverages; bouillons and soups; canned vegetables; corn oil, salad dressing, and spreads; and such snack foods as corn, potato, and tortilla chips.

In May 1968, anecdotal evidence of the MSG complex, or "Chinese restaurant syndrome," arose among American diners. Complaints of asthma, chest tightness, flushed skin, heart palpitations, hyperactivity, migraine headache, and mouth and throat numbness or swelling were reported in extensive testing in 1995. The activation of the pancreas appeared to threaten insulin balance in diabetics.

Health specialists drew ominous conclusions from the fact that Japan, the nation that consumes the most MSG, also had the world's highest rate of stomach cancer.

Because of inconclusive results, the FDA placed no ban on MSG, which appears safe in normal proportions. Food producers in Australia, New Zealand, and the United States require the identification of MSG on food labels but allow heavy saturation of fast foods with the additive. Fringe health groups continue to blame MSG for neurotoxicity that causes amyotrophic lateral sclerosis (ALS), Alzheimer's disease, autism, food addictions Huntington's chorea, and Parkinson's disease.

See also: Additives, Food; Industrial Food Processing; Organic Foods.

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[Moravian Diet and Cuisine](#)

Hospitality from the eastern third of the Czech Republic centers on entrées and artisanal beers and wines that have influenced the cuisines of Austria, eastern Bohemia, Silesia, and western Slovakia. From the second century C.E., Moravian cuisine earned a negative reputation from the Roman historian Tacitus for relying on berries, black bread, milk, porridge, and wild game. The grim diet altered significantly during the next half millennium toward rich aromas and

sweet-spicy delicacies, including mead and honey cakes. Moravian cooks gained a reputation that outranked neighboring specialists.

Lacking in financial primacy, farmers cooperated with the food industry to produce a series of seasonal specialties—asparagus, beets, cabbage, carrots, celery, onions, peas, potatoes, radishes, and turnips and harvests of buckwheat, corn, rye, spelt, and wheat. From the 800s C.E., growers shielded their grain supply away from flooding and near the community gristmill. Their pubs and inns gained fame for hearty pork with cabbage and dumplings, garlic soup, roast beef with sour cream, white wines, and dark beer, all at a reasonable price.

Moravian Christian idealism placed food at the heart of *agape*, the Greek concept of giving without expecting any return. Women embraced the task of the congregation kitchen with fervor, whether stuffing pork sausage into casings, filling aromatic cakes with plums and walnuts, drying plums for fruit leather, or soaking sour milk cheese in beer. At Christmas, they celebrated the central religious holiday with a Yuletide carp and a cookie pyramid. At Easter, a ham baked in chopped herbs covered with crust centered the movable feast.

The eighteenth-century Moravian pietists who settled Bethlehem, Lititz, and Nazareth, Pennsylvania, and Winston-Salem, North Carolina, adapted rapidly to New World gardening with beans, corn, pumpkins, squash, and sweet potatoes. They insisted on pure water from cisterns and wells. During fellowship with Indians in Georgia, missionaries gratefully accept dried venison and grouse as gifts and reciprocated with meals whenever natives visited their homes. During the singing of hymns with the Carolina Cherokee, evangelists passed baskets of

[Recipe: Moravian Spice Cookies](#)

Heat 1 cup of molasses and 1 cup of corn syrup with ½ cup each of lard and margarine. Stir in 1 cup of dark brown sugar. Add 6 cups of flour, 1 tablespoon of cinnamon, and ½ teaspoon each of allspice, ground cloves, and nutmeg. Knead the dough and let it rest for 72 hours. Atop 2 cups of flour, roll out cookies extra thin before cutting. Bake at 360 degrees Fahrenheit on greased cookie sheets for a scant 15 minutes.

sugar buns and mugs of coffee. In Alaskan missions Moravians bought char from the Inuit and stocked dried fish as famine food for the Indians.

For group meals and bake sales, Moravians imported unique baking recipes enriched with allspice, brown sugar, butter, cloves, molasses, and yeast. In North American missions, Moravian food relief promoted hygiene, nutrition, and the spiritual welfare of the needy, notably in their Labrador and Newfoundland outreaches to the Inuit and in East End, the typhoid-ridden Creole community of St. John in the Danish West Indies. In a ministry to the Delaware Indians of the Ohio River valley, Moravians made rapid conversions among hungry pregnant women and widows, who had no social support system to supply food.

Farther south, holiday sweets introduced in the 1740s at the *Christkindlmarkt* (Christmas craft fair) stressed the aroma of cinnamon and ginger in scotch cakes, sweet buns, and spice cookies, the star ethnic treat in Old Salem's Moravian bakeries. Distributed at Christmas love feasts, paper-thin spice cookies served with hot coffee competed with beeswax candles in Yuletide perfume. Today, via direct sales, charities, and the Internet, the sharing of the holiday with worshippers emphasizes the concept of one Earthly family, joined in love by Moravian delicacies.

Current Moravian cookery showcases intense flavors, from pickled gherkins, potato cakes sizzled in lard, and savoy cabbage to stuffed rabbit, fried carp with caraway seeds, smoked trout with dill, and braised pork knees and roast goose. Much of the fare is labor intensive, such as herbed meat rolls, potato turnovers with sauerkraut, and wedding tarts. Side dishes perpetuate heritage flavor blends—sweet noodles with poppy seeds, lentils baked with millet, plum jam with cottage cheese, Černá Hora and Kelt beers, and apricot brandy.

See also: Beer; Hearth Cookery; Pennsylvania Dutch Diet and Cuisine; Royal Greenland Trade Department.

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Mozambique Company

A semifeudal firm that ruled like a military government, the Mozambique Company (Companhia de Moçambique) transformed a Portuguese possession in Africa into a cohesive food producer between the late nineteenth and the mid-twentieth century.

The region, one of the most important agricultural sections of East Africa, exported cashews, cassava, copra, corn, fruit, mangrove bark, minerals, peanuts, potatoes, rice, rubber, sugar, wax, and wheat. Profitability lured explorers, prospectors, and speculators from Great Britain and Continental Europe. Joaquim Carlos Paiva de Andrada, the Portuguese military attaché to Paris and controller of land, mineral, and timber rights in the vicinity of Tete and Zumbo, ports on the Zambezi River, plotted an African empire.

Andrada joined land developer Manuel António de Sousa, head of the Ophir Company, and, with £40,000 in capital, organized the Mozambique Company in March 1888 in Lisbon. Because of limited resources in Portugal, further investments required selling stock to American, English, French, and German capitalists. Two months later, officials negotiated with the British the boundaries of Mozambique.

Under a 50-year royal charter in February 1891, the Mozambique Company acquired rights to minerals, fisheries, and customs and sole control over elephant hunting and human labor. Officials hired French engineers for a massive array of projects: the laying of the Beira and Mashonaland Railway to Massikessi south to the border of Zimbabwe, and the building of telegraph stations, harbors, quays, and docks.

After acquiring the province of Manica-Sofala, CEO Albert Ochs, a British national, established headquarters at the principal port of Beira and built barracks for laborers, who farmed some 60,000 square miles (155,000 square kilometers) of

fertile land. At the time, male African conscript laborers, bribed by gin, worked away from their small communities. African women provided for their families by cultivating gardens and making a nourishing beer from *mealies* (corn).

Ochs rated forced African labor as his top asset and further exploited natives by wresting hut taxes of 50 pence in the region from the Sabi River to the Zambezi. By 1902, food exports moved more smoothly because of new cranes and warehouses, a lighthouse, and sea defense at Beira. The company, one of the most profitable in southern Africa, recruited farmers and gained investors and capital to dramatically enlarge the original business plan.

Headquartered on supervised native plantations, the Mozambique Company ruled agricultural territory that produced agave and sisal as well as long staple Egyptian cotton and sugarcane. Competition from the Nyassa Company, which claimed vast acreage to the north, proved weak and sporadic.

In 1910, to enhance profits, John Peter Hornung, an Anglo-Hungarian from Yorkshire married to a Portuguese wife, managed Portuguese sugar plantations, controlled Zambezi River steamers at the Chinde port in southern Mozambique, and bought Lisbon refineries. Within four years, his conglomerate produced 30,000 tons (27,000 metric tons) of sugar annually. In 1913, the value of Mozambique Company lands reached £500,000.

The strength of Portuguese administrators prevented the takeover of Mozambique by German investors and by Cecil Rhodes's British South Africa Company. The Mozambique Company excluded all foreign control until 1913. As British and French entrepreneurs proffered capital for greater exploitation of East Africa, Libert Oury, the Anglo-Belgian railroad king and director of the Mozambique Company, dominated land transport concessions and Beira port business, which added duties and licensing and transit fees to profits from food exports. Influential British capitalists upgraded company profits and began negotiations for connections at major sugar warehouses to the Trans-Zambezia Railway. Contributing to successful food production, company investments in American steam engines, English plows, threshers, corn shellers, and wagons introduced technology to Portuguese East Africa.

Trade in cotton and sugar rose in value after World War I, when the Mozambique Company built a railroad from Beira north to Nyassaland and outpaced the colony in exports. Local labor gangs, reduced in number by war

losses and epidemic Spanish flu, required substitutions of migrant workers. Two companies dominated the sugar industry, Companhia Colonial de Buzi and Sena Sugar Estates, both owned by Hornung.

To supply the liquor industry, after 1920, the government required sugar planters to warehouse 10 percent of their cane in Mozambique. At least 75 percent of the cane crop went to Portugal. By 1924, one-third of the 100,000 contract laborers devoted their work to sugar. Because their real income remained at poverty levels, company peons relied on antelope and other bushmeat for subsistence.

At its height in 1925, the Mozambique Company streamlined sugar production to three times that of Angola's. The situation changed over the next year as prices tumbled and flooding reduced the cane crop. The colony as a whole exported five times the amount of food that the Mozambique Company marketed. By 1928, peanuts rose in volume to four times their former harvest.

In the 1930s, when the port of Beira handled £20 million in trade annually, tribal insurrections and banking and currency failures compromised company profits. In 1940, Mozambique laborers preferred jobs as stevedores or rail workers than as company field hands. The fascist regime of António de Oliveira Salazar curtailed the Mozambique Company's privileges in 1941, when the charter expired.

See also: African Food Trade; Portuguese Diet and Cuisine.

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Mustard

Foods blended with greens, oil, and seeds of the mustard plant bear vivid yellow, green, or brown color and a pungent flavor akin to horseradish. A wild family of 40 species of *Brassica* and *Sinapis* plants, mustard grew along the Mediterranean and in Himalayas, Middle East, and North Africa in Neolithic times. As a condiment, it colored the gastronomic writing of playwright William Shakespeare, Virginia gourmet Thomas Jefferson, and the soul food specialists of the Deep South. Commercial growing in Canada, Denmark, Hungary, India, Pakistan, the United Kingdom, and the United States satisfies the world's craving for a unique taste, which processors blend with lemon juice, salt, turmeric, vinegar, water, wine, and sometimes beer or whiskey. The resulting condiment, whether aged or fresh, pairs well with cheese, mushrooms, and grilled meat.

Mustard contributed to the first curry powder, which occupants of Mohenjo Daro in the Indus Valley in 4000 B.C.E. husked and winnowed before pounding the seed in mortars. A more distinctive taste derived in Bangladesh and Bengal from mustard and poppy sauce. In the Punjab, the seed, a natural hybrid, contributed to dal recipes and to a mango pickle in mustard oil. Egyptian cooks used mustard seed to dress spit-roasted geese and pigeon and mullet roe and treated fainting and seizures with therapeutic mustard seed water. Aramaic, Buddhist, Hebrew, Koranic, and Sanskrit imageries draw on the mustard seed as a metaphor for small size and zeal.

In classical history, Greek and Roman farmers turned wild mustard seed into a garden crop and a treatment for toothache and scorpion sting. Roman chefs introduced mustard to condiment history by blending the ground seed with grape must. From Julius Caesar's Gallic campaign from 58 to 51 B.C.E., soldiers learned to preserve meat in mustard brine. In the first century C.E., Campanian food writer Apicius recommended blending chicken and fish stuffing with mustard and spreading mustard sauce on the skin of roast boar. Legionaries on leave from North Africa brought home recipes for Egyptian ibis with mustard.

Medieval English cooks prepared a boar's head with crisp, brown skin and garnished it with mustard and rosemary. In 534 C.E., agroecologist Jia Sixie, a governor in Shandong Province, compiled an indexed guide to progressive

Chinese farming, *Qimin Yaoshu (Skills for Peasants)*, one of the world's oldest agricultural monographs. Among his advisories, he listed directives about growing and harvesting mustard.

Unlike imported black pepper, the condiment of the privileged, mustard cost little because it grew wild within reach of peasants. In the late 700s, mustard accompanied the Viking dead in funereal boats to a watery grave. Charlemagne's directive *Capitulare de Villis (The Supervision of Manors, ca. 800)* specifically ordered cleanliness in the preparation of mustard. A century later, Christian monks in Paris revived Roman technology for processing mustard. Late medieval mustard recipes from Lombardy added apples, berries, and lemon to mustard sauce as a condiment for game.

During the age of voyages in the 1600s, Portuguese mariners brightened dull ship's provisions with mustard. In the Caribbean, the standard slave diet depended on mustard greens, purchased at weekend markets in Antigua, the Bahamas, Barbados, Jamaica, and St. John. In England, naturopath Nicholas Culpeper, author of *The Complete Herbal (1653)*, promoted mustard as a treatment for depression.

Mustard also accompanied diverse immigrant groups to North America. From the 1680s, Pennsylvania Dutch cooks reduced horseradish and mustard into table condiments to serve with fresh shad and oyster stew. Pioneers to Indiana added mustard greens to wild food staples. In the eighteenth century, Prussian king Frederick the Great aroused his passions with a mustard concoction from his secret recipe, which he added to his coffee.

Nor did mustard escape the influence of innovators. In 1777 in east-central France, Maurice Grey and Auguste Poupon introduced their Dijon brand, Grey-Poupon, a tangy table spread. In 1854 during the Crimean War, Scots Jamaican herbalist Mary Jane Seacole prepared mustard plasters to treat pneumonia in soldiers. At Amoy in Fukien, China, street vendors sold a regional snack pancake wrapped around cooked filling and hot mustard. Not until Isabella Mary Beeton published *Mrs. Beeton's Book of Household Management (1861)* did British curry achieve its savory boost from a blend of allspice, cayenne, cinnamon, fenugreek, and mustard.



Muslim women carry baskets of harvested mustard in the Kashmir Valley, in the northern Indian subcontinent. The seeds are ground and mixed with vinegar and other ingredients to make condiment mustard; the leaves can be eaten as mustard greens. *(Rouf Bhat/AFP/Getty Images)*

At the New York harbor, entrepreneurs George Francis Gilman and dry goods clerk George Huntington Hartford, the original partners of the Great American Tea Company, sold cut-rate Chinese and Japanese tea and mustard on credit at bulk rates one-third that of retail cost. By the late 1890s, immigrant families across the United States supported mustard sales from the Sears, Roebuck catalog. At U.S. baseball stadiums, the purchase of a hot dog or pretzel with yellow mustard has been integral to the flavor and lore of the national pastime. South Carolina barbecuers favor mustard-based sauce over brown sugar and molasses.

In the diverse Szechuan province, Chinese vegetarians retreated from the ever-present pork and poultry with cabbage hearts and cucumbers in mustard dressing. Street peddlers served a piquant lunch or zesty snack of fragrant noodles topped with pickled mustard greens. In the 1970s, gourmet restaurants blended honey with mustard to produce a complex topping for salmon. Current research connects the mustard plant with cyanates that combat arthritis, asthma,

and migraines and inhibit cancer of the colon and stomach.

See also: Adulterated Food; Barbecue; Condiments; Holiday Dishes and Festival Foods; Immigrant Diet and Cuisine; National Dishes; Oils; Pickling; Roman Diet and Cuisine, Ancient; Spices; Vinegar.

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N

National Dishes

The food that characterizes a people and its foodways, national dishes illustrate the ingenuity of an ethnic group in readying popular local ingredients for the table. Staple foods derive from the geological and climatic constants, such as *muktuk* (whale skin and blubber) among the Inuit, flying fish in Barbados, *fufu* (a starchy paste) in Liberia, koumiss (fermented mare's milk) in Mongolia, and reindeer among Sami herders. As heritage foods and culinary tourist draws, a people's common recipes display identity and self-expression as insistent as French champagne and crepes, German bratwurst and mustard, Greek ouzo, Indian ghee (clarified butter), and New Zealand lamb.

The urge to experiment and personalize produces myriad variants on a standard theme, the reason for recipe alterations in Indonesian *satay* (spiced and grilled meat), Korean *kimchi* (fermented vegetables), Sri Lankan curried rice, and Algerian couscous. Expatriates reset memories of home with adapted foods in new lands, transferring German sauerbraten to northern Texas and Russian blini with caviar to Israel. Attempts at authentic bistro and café fare force compromise on the Ukrainian cook stirring up borscht with sour cream for diners in the Greek Isles and the Chinese chef attempting Peking duck in Sydney, Australia.

National favorites are subject to change, particularly from threat of extinction—for example, the fate of the Bactrian camel, blue whale, cayman, Hawaiian goose, and leatherback sea turtle. After European settlers destroyed the North American buffalo in the mid-1800s, the Plains Indians of Canada and the United States lost a source of pemmican, America's first international processed food. An outcry from conservationists inveighed against Chinese service of shark fins and turtle eggs and flippers.

Positive changes evolved from the introduction of technology, such as automated taco makers in Central America, the clay tagine among the Berbers of Morocco, and electric fondue pots to melt Swiss Gruyère dip. The introduction of

new foodstuffs as valuable as corn to Italian polenta, rice to Portuguese paella, springbok to Boer stews, potatoes to Jewish latkes (potato pancakes), chocolate to Swiss confectioners, and coffee and tea the world over initiate lasting changes to age-old eating styles.

A nation's cuisine fits merchants and consumers as naturally as the lay of the land. Lutefisk travels well to Sweden's diverse locales; likewise, ingredients for *pot-au-feu* are available throughout France, as are tart cooking apples in the United States for apple pie, sloes for English gin, peanuts for Chadian sauces, and raw fish for Japanese sushi. For Israelis, falafel, a fried ball of ground chickpeas, suits both the home table and the street diner, as does a salad of chopped cucumber and tomato dressed with lemon juice and oil, onions, and parsley. The appeal of national dishes also spreads favorites to new locales, the destiny of English fish and chips, Taiwanese noodle soup, Nigerian kola nuts, and Turkish kebabs. Over time, ethnic gastronomic terms—*barbecue, bourbon, coffee, Danish pastry, dumplings, pilaf, pita, ramen, salsa, sangria, schnapps, yogurt*—crop up on menus worldwide.

See also: Fish and Fishing; Heritage Foods; Indonesian Diet and Cuisine; Language, Food; Manioc; Nutrition; Rice; Seaweed; Soups.

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[New World Commodities](#)

The late-fifteenth-century exposure of Genoan sailor Christopher Columbus to North American biota introduced much of the world to a broadened palate of tastes, aromas, and textures. The first explorers of the Americas discovered beverages, fruit, meats, oils, and vegetables known for millennia to indigenous people, from *yerba maté* (leaf tea), grapefruit, and Muscovy duck to candlefish and cottonseed oil and tomatillos. Ship provisioners added to the standard peas and flour new possibilities from corn, potatoes, red beans, and sunflower oil, all staples on galley shelves for long voyages. In addition to common ingredients—arrowroot, lima beans, field peas, manioc, wild rice—Spanish explorers experienced a panoply of tastes, including the first smoking tobacco, coca, tomatoes, and the bitter taste of cinchona bark, the source of quinine, a treatment for malaria.

Over some five centuries of adjustments to standard recipe collections, the Columbian Exchange wrought lasting variety and vigor to cuisine in Africa, Asia, Australia, Europe, and Polynesia. Throughout the Western Hemisphere, avocados, bergamot, blueberries, cashews, cranberries, guavas, mangos, papayas, pecans, persimmons, and tarragon invigorated the diet with the mouthfeel and taste sensations of indigenous products. The chili pepper generated zip in Szechuan vegetable, fish, and meat dishes. The prickly pear provided a tangy desert fruit that flavored sweets and beverages. In the American colonies, jicama, pumpkins, and winter squash offered hard-shelled vegetables that could last into winter.

The pineapple spiked so many punch bowls that the prickly fruit with its perky leaf crown became a standard door carving, a colonial symbol of welcome in the Carolinas, the Caribbean, and elsewhere in the Americas. Chicle created a niche sweet with chewing gum, a treat that Mayan children had enjoyed for generations. Maple syrup offered new choices in baking and the binding of baked beans. Cacao, flavored with cane sugar and vanilla, founded a beverage and confection industry. Additional drinks from agave, corn, and greenbriar added tequila, *pulque*, and sarsaparilla to the bar list.

The infusion of interest in late Renaissance cuisine, the immediate result of the Columbian Exchange, provoked controversy as well as consumerism. Hearsay labeled the potato both an aphrodisiac and a source of leprosy and scrofula. The tomato earned bad reports for potential poisonings and, in England, as a cause of

gout. The turkey, an unattractive American bird, at first provoked little enthusiasm, a fate that also befell manioc, sapodilla, and quinoa flour. More acceptable for its sweetness, the sweet potato won a place in the kitchen for its adaptability as a baked tuber and a source of pies and puddings. Nuts, including the Brazil nut and the macadamia, contributed new flavors for candies and snack food.

The variant attitudes toward New World foods precipitated a revolution in global dining. In 1521, Ferdinand Magellan took corn and tomatoes to the Philippines, where cooks accepted the new ingredients. Voyagers transported the tomato to China, India, and Japan for use in salads, sauces, and stews. Likewise, Central American chili peppers cut into the black pepper trade and sparked bite and heat in Asian, Ethiopian, and Hungarian cuisine. In Ireland, the planting of the potato in poor soil in 1625 supplied an agrarian nation with a readily grown famine food. Germans expanded their population and improved health from potato crops. Manioc, yams, and the Amazonian peanut performed a similar service for poor Africans and Asians.

Corn fed Chinese nomads fleeing the overcrowded Yangtze River area and, after 1783, sustained the American bourbon whiskey industry. Zucchini furnished French chefs a basis for ratatouille and Bulgarian, Spanish, and Turkish restaurants a source of pancakes and stuffed vegetables. The sweet potato enlivened the Filipino and Maori sea diet and supplied a new money crop to island peoples. Roast turkey cost so much in Europe that only the elite of France and Venice could afford it. The income boosted the poultry market with its first fad species.

See also: Blueberries; Cacti; Chicle and Chewing Gum; Chocolate; Columbus, Christopher; Corn and Maize; Jerky; Jiménez de Quesada, Gonzalo; London Virginia Company; Manioc; Pan-European Diet and Cuisine; Pemmican; Peppers; Potatoes; Poultry; Standish, Miles; Tudor Diet and Cuisine; Vanilla.

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[Nomad Diet and Cuisine](#)

For their daily food, wandering peoples throughout history have relied on subsistence hunting of game, herd, and shore animals, gathering of wild plants, and trading with merchants and other journeyers. The constant uprooting of Tuareg cameleers in the Sahara, South African Bushmen, Chukchi walrus hunters, and Kyrgyz mountaineers limits the size and extent of the pantry and the number of metal pots and implements families can carry. Constrained resources produce predictable one-pot menus usually eaten communally, such as the goat soup served at Hmong gatherings in Southeast Asia and the milk diet of the Masai and Samburu pastoralists of Africa and the Sarakatsani of the Balkans and northern Greece.

Nomadic eating styles adapt to local exigencies. In prehistory, nomads nurtured a contempt for city dwellers' pork because constant movement prohibited transient tribes from keeping swine. For convenience, Turkish Tartars and the Bakhtiari of southern Iran cook lamb cubes as kebabs; Inuit carnivores, who lack firewood, eat whale blubber raw. Living on as limited an animal diet as the Gujjars of northern India, the Afar herders of Ethiopia subsist on milk and meat and trade salt for fruit and vegetables. The Ainu of Hokkaido, Japan, reject uncooked food in preference for the dried, roasted, or smoked meat of badger, fox, salmon, sea anemones, and wolf. They make flat dumplings from the pounded *ubayuri* lily bulb, a source of subtly flavored starch.

For wanderers, sharing is a way of life. Qatar's nomads roast whole goats, hares, and sheep and serve the meat in a communal dish along with ember-cooked truffles, buttermilk curds, dates, and dried locusts. Thin rounds of

unleavened bread take the shape of a convex iron griddle, which rapidly toasts dough. Beverages served to clan members range from camel's milk to sugared coffee and spiced tea. From trades with merchants, Bedouins from Morocco to Syria and Oman add to their menus citrus fruit, dried apricots and figs, seasonings, and tahini, a sesame seed paste used in creaming crushed chickpeas into hummus.

Living with semidomesticated mammals influences diet and health. Sami reindeer herders in Scandinavia rely on dried and smoked venison as well as bear, elk, and mountain goat meat, which they relish down to the hooves, marrow, and udder. The blood and liver go into bread and black pudding. A similar husbandry with char and trout yields fish cakes and intestines and roe, eaten with potato dumplings. For flavorings, the Sami collect cloudberries and lingonberries as well as angelica buds and sorrel for mixing with reindeer milk for storage in kegs. To broaden their food choices, the Sami trade for barley flour, coffee, horse meat, and liquor.

Another meat-centered culture, Mongolian nomads focus on meals of boiled mutton with *borts* (reindeer or camel jerky), handmade noodles, and mugs of tea mixed with camel or mare's milk, a symbol of hospitality. The horse supplies *airag*, a fermented milk drink filtered through cloth and ripened in animal gut and leather bags suspended from wood frames or a yurt ceiling. For Tibetan women, yak milk processing, curd drying, and yogurt draining center daily chores along with frying bread and cooking in cauldrons and woks.

Kettle cookery, griddling, and spit-roasting over a campfire, the traditional slow food method of the so-called Gypsies—the Roma, Sinti, and others—serve the 15 million who travel Bosnia, Bulgaria, Germany, Hungary, Ireland, Romania, Russia, and Spain. Day laborers take their wages in flour and lard. Both men and women prepare and serve meals. Despite a transient existence, the Roma dine well on roasted apples and almond cakes, clay-baked hedgehog and trout, snails in broth, and fig cakes, a nourishing travel snack.

Since their migration from India through Armenia in the 1300s, the Roma acquired the nutritional and medicinal lore of berries, nettles and beech leaves, and herbs. Near the sea, they collected limpets and mussels while enhancing their grocery purchases on the proceeds of horse trading. A yen for full-flavored meat limited their consumption of beef and mutton in favor of geese, goats, pork, and

wild salmon. A store of dried mushrooms flavored ragouts; dandelion roots ensured a strong ingredient for coffee, which the Roma flavored with wild honey.

Currently, the Roma treasure recipes rich in butter and eggs from free-range hens, molasses and unrefined sugar, and wholemeal flour. For luck, cooks use generous amounts of bread, garlic, pepper, salt, and vinegar. Hunting and gathering nets dulse, eels, and sea kale from the shore as well as game and seabird offal for soups and gooseberries and mulberries for boiled pudding. A favorite recipe for children involves the hollowing of a potato to hold elderberry jam before baking in embers. To avoid Gypsy taboos against impurity caused by the handling of cats and dogs, the slaughter of horses, or the contamination of menstruating women, the Roma avoid unclean strangers and the institutional kitchens of hospitals and schools. Rather than use forks and spoons polluted by *marimé* (non-Roma), they eat with their hands and a knife.

See also: Crackers; Endangered Species; Fish and Fishing; Hunter-Gatherers; Nuts and Seeds; Pit Cookery; Sicilian Diet and Cuisine; Trade Routes; Travel Food; Wild Food.

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Noodles

A universal staple, noodles, whether made from beans, buckwheat, corn, potatoes, rice, soy, or soft wheat, add texture and variety to broth, salads, and meat and vegetable entrées. In about 10,500 B.C.E. at Nevali Cori, Turkey, the

historic transition from hunting and gathering to domesticated einkorn wheat began the shift in cookery from pit-roasted meats to bread, flour, noodles, and pasta. Noodles appear to have originated in Afghanistan, Kyrgyzstan, and Tajikistan, where cooks created *laghman* by simmering the dough strips in spices. In Guangdong, on China's southeastern shore, beginning in 4000 B.C.E., Chinese chefs flavored flour blends with alkali salt and experimented with hand-looping and stretching dough repeatedly to achieve a viscosity that held together strands.

As early as 2000 B.C.E., the northeastern Chinese of Shandong blended broomcorn and foxtail millet with soy and wheat noodles to add to dishes of mung beans and tofu for a diet rich in carbohydrates and protein. Tartar horse men added hand-rolled noodles to mutton stews. In Singapore, to meet the demand for inexpensive food for manual laborers, noodle making became the nation's first industry. Asian diners perpetuated the Lunar New Year myth that the length of the noodle predicted longevity. Similarly symbolic, Persian cooks welcomed the New Year with string egg noodles, a symbol of life strands and unavoidable snarls.

From ancient China, India, and Persia, cooks in the Middle East and the Mediterranean learned to break down gluten in yeast dough. In a modification of recipes for dumplings and pasta, cooks stretched thin strands into noodles for frying or adding to soup. Tibetan *thukpa*, a meaty noodle dish, spread in popularity to Nepal and India, where chili powder perked up bland egg dough with heat and piquance. On the Russian steppes, noodles complemented bread, fritters, and meat-filled *pirozhki* (dumplings). In Japan, the translucent, rubbery *shirataki* noodles began with the elephant yam, a perennial tuber high in fiber and low in calories.

Noodle aficionados pressed dough into shape with a handleless Asian rolling pin and kneaded the mass into thin blocks for cutting and oiling to prevent sticking. Cooking required high heat for a brisk boil or for a regimen of boiling, blanching in cold water, and a return to hot water. Chopsticks assisted in drainage by lifting and separating strands to keep them whole. In southern India and Ceylon, fast-food chefs used a string hopper to force rice batter into strands for *muruku*, a crisp-fried snack popularized in Fiji and Malaysia. In contrast, the Chinese made rice noodles from batter steamed and folded into accordion-pleated layers for slicing.

In the 1100s, the high cost of wheat flour made noodles a dish for the wealthy. Swabians in the late Middle Ages pushed batter through a sieve to make *spätzel*, an egg noodle served with sauerbraten and gravy or in a grated apple dessert. In colonial America, Pennsylvania Dutch egg noodles took on a vibrant yellow with the addition of saffron. By 1900, extruded noodles simplified the rigorous job of hand-pulling and -cutting dough. Chinese restaurateurs and street stall vendors profited from the inexpensive extenders of dishes made with more costly meats and fish. The invention of instant flash-fried noodles in August 1958 by Taiwanese Japanese businessman Momofuku Ando, founder of Nissin Food Products, boosted the popularity of curly or straight dough threads for hospital and school meals and factory and office lunches.



Villagers in eastern China's Zhejiang Province make noodles by hand according to traditional recipes. They produce hundreds of tons annually and ship it off to sell in bigger cities. The Chinese have been making wheat noodles since about 4000 B.C.E. (*Imaginechina/Associated Press*)

A favorite breakfast food, Taiwanese *misua* noodles, Sino-Mongolian oat curls, Japanese *champon* (pork soup) and ramen with nori (seaweed), Hong Kong milk noodles, Korean acorn starch noodles, or Vietnamese *pho* (rice vermicelli) cook

rapidly in meat and vegetable broths. *Yakisoba*, a Japanese dinner dish of fried noodles with pork and cabbage, enlarges on traditional Mandarin chow mein. Chinatowns in Australia, Canada, Holland, the United Kingdom, and the United States feature *lamian* as familiar tourist fare. In Singapore, cafés and wet markets offer *mee pok*, a sauced noodle that anchors servings of fish balls and chopped pork.

Noodles complement a variety of presentations and additions. Filipino diners patronize *panciterias*, restaurants specializing in *pancit* noodles. Malaysian *bakmi* (wheat noodles), boiled separate from broth, come to the table with a choice of bok choy, diced chicken, gravy, meatballs, and wonton. The Japanese udon is available in microwavable soup cups; *somen* restaurants pass noodles through cold water along a bamboo chute for diners to grasp with chopsticks and dip into hot sauces.

Salad bars incorporate multicultural fare— noodles, pasta salad, pita chips, tortilla strips— into refreshing layers of carbohydrates with raw vegetables and fruit. Slow Food menus feature chewy noodles along with tacos and vegetable wraps as methods of preserving world food heritage. An intriguing addition to cuisine, Penang noodle salad begins with chickpea noodles dry-fried in chili flakes and grated coconut before flavoring with curry powder. Condiments include Burmese fried garlic, Cambodian fish sauce, Chinese cabbage and pickled radish, Filipino annatto oil, Indian garam masala, Japanese green tea powder, Korean *kimchi* (fermented vegetables) and sesame salt, and Sambal chilies and lime.

See also: Customs, Food; Dye, Food; Exotic Food Clubs; Fusion Cuisine; Japanese Diet and Cuisine; Language, Food; Russian Diet and Cuisine; Tofu; Yeast.

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North African Diet and Cuisine

Originating between desert and sea, the cookery of Algeria, Egypt, Libya, Morocco, and Tunisia elevated the sensual pleasures of eating. Ingredients thrived on the continent's north shore. Berber growers cultivated wheat from 30,000 B.C.E. Dates flourished in Egyptian gardens as early as 4000 B.C.E., Cretan olives after 3000 B.C.E., and almonds around 1325 B.C.E.

After 1000 B.C.E., Phoenician seafarers augmented the northeast African peasant triad of beer, bread, and onions with *merguez*, a spiced sausage based on mutton or goat meat, *asida* (buttered wheat custard), seafood, and porridge made from barley, bulgur wheat, and semolina, a coarse meal ground from durum wheat. By 200 B.C.E., the North African elite dined Greek style with shallow dishes and handled drinking bowls. Roman occupation after 146 B.C.E. introduced figs, pomegranates, artichokes, and truffles and deeper bowls for pulses. Engineers set up the technology for pressing olives into olive oil and brewing barley into beer, a specialty at Cyrene, a Greek colony in Libya. In Algeria, local vineyards supplied Roman wineries.

Berber nomads developed couscous, a soft carbohydrate served with ewe's milk that blended with meat offal, roast quail, and vegetables. By shaping clay into the conical *tagine* and heating it over an olive wood fire, desert wanderers developed a slow-braised stewing technique for lamb, pigeons, rabbit, and meatballs that flourished in Morocco. The flavoring of the mix with pome fruit, raisins, plums, melons, and quince and a sweet-sour emulsion of honey and lemon pulp enhanced aromas and flavors. Hibiscus, Koshary, or mint tea or tamarind juice rounded out the evening with a bracing taste that settled the stomach for sleep.

To tagine cookery, in the 600s, Arab traders introduced Indian and Malaysian flavorings— cloves, ginger, saffron, nutmeg, cinnamon, turmeric, paprika, and mace. From a trove of new flavors, the developing Islamic culture evolved complex combinations of *rasel hanout*, a spice blend made from cardamom,

mallow, dill, pepper, anise, cumin, caraway, nutmeg, fenugreek, orrisroot, and dried roses. The flavorings boosted the overnight baking of stew in urns, a one-pot meal shared by extended families. Ottoman pastry chefs demonstrated methods of combining wheat flour, honey, nuts, and spices into baklava and dessert pancakes topped with yogurt.

Spanish discoveries in the 1500s united Mediterranean Rim cuisine with corn, zucchini, tomatoes, chili peppers, vanilla, peanuts, and potatoes from Mexico and Peru. With *khubz* (flatbread) and puffy pita bread, North Africans initiated the shaping of flat cakes into utensils for scooping tahini (sesame) sauces, wrapping falafel (chickpea patties), and sliding kebabs off skewers. Greek stuffed grape leaves added another dimension to finger food that enfolded juicy tomato and onion sauce and rice in a handy sleeve.

Tagine innovations extended to the tenderizing of quail and pigeon, fish, egg mixtures, and dried chickpeas with the condensation that trickled down the steeped lid. North African chefs evolved unique herbal blends unknown in Cyprus and Greece, notably smoky *harissa*, a mix of chili peppers, coriander, cayenne, caraway, olive oil, and garlic. By rubbing haunches of roasted meat and eggplant with the blend, Tunisians individualized their cuisine from that of Egypt and Morocco. An additional touch, the thickening of puddings with mastic changed custard texture into a chewy dessert.



Moroccan tagines are long-simmering stews—this one made with chicken, prunes, tomatoes, and seasonings — named for the clay vessel in which they are cooked. The conical cover directs condensation downward; the round base becomes a serving dish. (*Larry Crowe/Associated Press*)

Colonialism by French and Italians imparted touches of European elegance, such as breakfast omelets, ratatouille, nougat, rice pudding, wine, yeast breads, fava bean snacks, and poached saltwater fish. The Moorish occupation of Iberia added gazpacho to Algerian soups, salads of oranges and fennel, and *tabil* (ground coriander and caraway) for seasoning veal and game.

See also: Egyptian Diet and Cuisine, Ancient; Heritage Foods; Ibn Battuta; Idiocuisine; National Dishes; Olives and Olive Oil; Trading Vessels.

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North American Diet and Cuisine

The initial settlement of British, French, and Dutch pioneers in Canada, the Maritimes, and New England introduced newcomers to an unfamiliar milieu. From the colonial era, continental cuisine made use of unique ingredients—maple sugar and syrup, cranberries, persimmons, and hickory nuts as well as abalone and prairie chicken. Kitchen herb beds grew mint, chives, wild celery, and lavender for flavoring succotash, pheasant, catfish, lobster, clam chowder, oysters, and bream. The woods rewarded children's expeditions with bird eggs, mushrooms, fiddlehead ferns, and wild onions. They eagerly crushed and seeded saskatoon berries, rose hips, and muscadines for jam and fruit leather.

Dogtrot cabins centered meal preparation and preservation at a stone fireplace on one side of a central hallway. Above the hearth, leather breeches, beans, and squash or pumpkin rounds dried for winter one-pot meals flavored with bacon. In the domestic area, the house wife churned cow's milk, rolled butter, pulverized maple sugar, boiled sweet corn and crabs, and secured canned turnips, carrots, and berries in chimney cupboards that kept garden goods from freezing in winter. Cabbage chilled in the spring house. Mounted pegs held drying dill and rosemary for pickling cucumbers and beef.

Gendered training readied girls for shelling corn for pone, pouring griddle cakes, and mortaring lard with sage and bay leaves for frying trout and venison. Kitchen amenities included a tin sausage stuffer for preserving pork, an osier basket for draining cottage cheese, jugs for poaching hare, and a cheese ditch, a spouted trough on legs for paddling cheese curds and draining whey. Cooks sped the roasting of turkey, pheasant, and quail by spitting carcasses in a tin reflector

and seasoning with imported mace, pepper, nutmeg, and an onion studded with cloves. Affluent house holds preferred biscuits and milk gravy for breakfast. For pudding, the cook mixed flour, sugar, dried peaches or apples, raisins, and nutmeg and boiled the dough in a cloth bag.

Young men learned cider making, grain reaping, hunting, fishing, and trapping, a source of crabs, lobsters, rabbits, opossums, squirrels, snipe, and groundhogs. In Montreal and Halifax, lads sliced caribou and sockeye salmon into strips for jerky, salted cod, and hung pork chins for smoked meat. Grist milling, another man's job, produced the flour and meal for colonial oatmeal cookies, corn bread, and cornmeal mush. Men chopped hardwoods to stoke the community beehive oven, which produced the baked beans, rye loaves, spoonbread, muffins, apple pie, and pones of a diet heavy in carbohydrates.

Integral to North American diet and cuisine, the exploration of western territories, Alaska, and the Hawaiian Islands enlarged staples with Indian hominy, buffalo, wild rice, bear, seal, pineapple, salmon, passion fruit, candlefish, nene, and elk. The importation of African slaves added okra, black-eyed peas, Brunswick stew, and collard greens. Black farmers grew peppers for barbecue sauce, shelled peanuts for pocket snacks, raised hogs for sausage and brains, and kept chickens for eggs. Lard and fat meat seasoned such soul food as fried chicken, frog's legs, poke greens, pork rinds, and hoppin' John. Cajuns turned pecans into ingredients for pies and pralines, sliced cold cuts for poor boys, and added *filé* powder (ground sassafras) to jambalaya, a one-dish rice-and- meat meal.

The American melting pot layered outback recipes with new takes on cooking and foodways. From Germany came lager, bratwurst, kaiser rolls, stollen, and kuchen; from Ireland, white potatoes, bannocks, and whiskey. Jewish cooks turned potatoes into latkes and cucumbers into dill pickles. Scots cattle ranchers bred sturdy herds on the frontier. Nordic immigrants spread holiday tables with lutefisk and berry jams.

After 1798, a resurgence of admiration for French revolutionaries restored respect for egg dishes, ices, beignets, Quebec taffy, *bûche de Noël* (Yule log), and vanilla custards. Florida citrus groves yielded fruit for breakfast and snacks. Pennsylvania mining communities and logging camps around the Great Lakes amalgamated the influence of Scandinavians, Pole, Italians, Slavs, and Russians

into an all-American taste for pastrami, horse radish, corned beef, gin, sauerkraut, deep-dish pizza, pretzels, cole slaw, hot dogs, gyros, pierogis, and pickled herring.

The combined juxtaposition of East with West in World War II, the Korean War, the Vietnam War, and the Iraq and Afghan is tan wars widened American awareness of foreign cuisines. Urban restaurants offered French wines with coq au vin. Mom and Pop café menus featured *kimchi*, pad thai, *satay*, spring rolls, and fish sauce. Into the twenty-first century, soldiers returning from Afghanistan and Iraq retained a fondness for flatbread and pilaf.

See also: African Slave Diet; Amerindian Diet; Beef; Buffalo; Cajun Diet and Cuisine; Cod; Columbus, Christopher; Fast Food; Immigrant Diet and Cuisine; McDonald's; Pennsylvania Dutch Diet and Cuisine; Pork; Soul Food; Tex-Mex Diet and Cuisine; Verrazzano, Giovanni da.

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[North Borneo Company](#)

A chartered Malaysian trading firm from the early 1880s to the end of World War II, the British North Borneo Company Provisional Association, Ltd., developed into both colonial governor and trading syndicate. Profiteers hoped to replicate the successes of British imperialism in Africa and India by specializing in such

culinary exotica as dried cuttlefish for wok frying and bird's nests for Chinese soup. Under the aegis of the British Empire, the venture, chaired by Alfred Bent, went into business in August 1881 in Sabah and exploited trade relations with China.

After obtaining a charter from Queen Victoria on November 1, the firm headquartered at Pulau Gaya and maintained an arsenal at Kudat to add military muscle to the warehousing and sale of prime goods. By replacing counterfeiting, opium dealing, piracy, slavery, smuggling, and tribal anarchy with sound fiscal management, exporters promoted trade in coffee, cuttlefish, oysters and skates, palm and vegetable oil, and pepper as well as in catch dye, rattan, rubber, timber, tin, and tobacco. Company balance sheets omitted a sizable investment in local gambling and opium, a popular recreation among Chinese and Muslims that bolstered struggling commerce in food.

Officially, the North Borneo syndicate nurtured trade in standard jungle goods from Mantanani Island, the Padas district, and the Putatan River. Agents recruited indentured field labor from Java and Hong Kong and encouraged immigration of Cantonese and Hakkas, who agreed on condition of their continued access to opium. British engineers began mapping rail routes through jungle and swamplands and erecting lighthouses. On the way to buyers in Bengal, Canton, Macao, Manila, and Singapore, cargoes passed through company ports in Chinese, English, and company vessels.

By 1887, exports increased by 336 percent, from \$159,000 to \$535,000 annually. In 1888 and 1889, sales flourished in local produce: bird's nests (for soup), dried sea cucumber, gutta-percha wood, pearls, pepper, rice, and sago. The price of swiftlet nests, retrieved from seaside cliffs and caves between February and May, remained stable, offering a huge profit for the birds' gluey saliva. Hong Kong diners consumed 60 percent of the world's supply of nests, dubbed "the caviar of the East" and "white gold."

The territory of the North Borneo Company increased in 1889 with the addition of the crown colony of Labuan to the British protectorate. Brisk sales in beeswax, camphor, guano fertilizer, gum resin for lacquers and paints, mother-of-pearl and tortoise shells, and sponges paralleled profitable food exports of agar seaweed gelatin, bananas, cocoa, keema clams, nipa palm fruit, and sugar. One exotic commodity, green, hawkbill, and leatherback turtle eggs, considered an

aphrodisiac and blood tonic, required careful handling. Diners boiled them slightly, then made an opening in the shell and sucked out the gelatinous contents. Food entrepreneurs also hoped to cultivate and exploit betel nut, cassava, citronella grass, copra, mango, and sweet potatoes and to advance the food trade with Australia and the Pacific Rim.

The Japanese military occupation of Borneo from December 13, 1941, to August 1, 1945, resulted in the destruction of plantations and docks and in violence against immigrant Chinese laborers. Losses bankrupted the North Borneo Company in 1946.

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Nouvelle Cuisine

A shift in French cookery from rich, embellished showpieces to simpler fare using less flour and fat earned the name *nouvelle cuisine* (new cookery), a much ballyhooed fashion of the 1960s and 1970s.

Classic French style, which dominated much of the world's menus and intimidated lesser cooks, carried the name *haute cuisine française* (high French cookery) both as a description of its ambitions and of the heaped entrées that adorned platters and banquet centerpieces. Originated in the royal kitchens of Louis XIV after 1643 for his marathon banquets at the Palais de Versailles outside

Paris, this complex food preparation idealized rich marinades and flambé saucing. Event managers aimed for elegant presentation and table staging *à la française* (in the French style) for public display and carving and plating by liveried waiters.

Food Fight

Exemplified in the writings and work of chef Auguste Escoffier during the belle époque, haute cuisine achieved a top-heavy grandeur and high drama. Amid feather and flower garnishes, flavor and nutrition received perfunctory attention.

Prefaced in the 1930s by the radio broadcasts of nutritionist-chef Édouard de Pomiane, pared-down style gained credence during the rationing and austerity of World War II. Nouvelle cuisine facilitated a revolt against the complicated celebrity fare of cookbook mavens and television chefs. The trend gained cachet by targeting the slim, adventurous esthete, the jet-setter who sampled exotica in remote global settings.

Around 1960, food critics Henri Gault and his colleague Christian Millau, authors of a series of travel guides, revived the term *nouvelle cuisine* from the writings of Vincent La Chapelle, chief cook to the Earl of Chesterfield and the Prince of Orange, who pioneered a scaled-down gastronomy in *Cuisine Moderne* (*Modern Cookery*, 1733). Gault and Millau marveled at the creativity of French chef Paul Bocuse, the “Pope of Nouvelle Cuisine,” and his imitators, Alain Chapel, Michel Guérard, Paul Haeberlin, Jean and Pierre Troisgros, and Roger Verge. Their unconventional free-form cookery, which began in 1959, renounced French formalism. Designer recipes and kitchen techniques called for less starch in thickeners and binders in favor of mild, light-textured fruit and vegetable purées.

Chef as Artist

Serving sensual arrangements of foods in unusual combinations required a larger plate, which framed a small quantity of ingredients that the cook posed at center like a work of art. In place of massive servings, these scaled-down groupings of

stir fries, sautéed vegetables, pasta, and ragouts drew the eye to clever twists of mesclun, miniature ears of corn, slices of kiwi and mango, slivered almonds, sushi, and raspberry sauce. Herb-and fruit-enhanced vinegars, tasty stock, and pot liquor redolent with peppercorns and the savor of the main course greeted the eyes, nose, and palate. Media food writers and television chefs tempted the enterprising cook with regional specialties, such as Southern grits and shrimp, Greek goat cheese soufflé, Southwestern salads with piki corn chips, and native American squash blossoms stuffed with rice and piñon nuts.

Redesigned meals liberated menus from affectation. Novel recipes bore little resemblance to historic feasts and excesses, such as roast boar on a platter, the disguise of a chicken breast under Mornay sauce. The credo of the new gastronomy appeared in “Vive la Nouvelle Cuisine Française,” the cover story of *Nouveau Guide Gault-Millau* magazine for October 1973. The text promoted daily selection of ingredients requiring less refrigeration and stove time and light saucing with reductions rather than traditional cream and roux (fried flour). Professional cooks favored more limited menus that changed frequently to reflect seasonal ingredients.

In a period of renewal, professionals and home cooks, particularly in Britain, France, and the United States, abandoned food snobbery. For guidance, they turned to the recipes and suggestions of Bocuse’s two classics—*La Cuisine du Marché* (*The Cuisine of the Market*, 1976) and *La Journée du Cuisinier* (*The Chef’s Day*, 1980). Homemakers and weekend cooks found the new cookbooks stimulating rather than daunting and the minimalist recipes rejuvenating rather than heavy and indigestible. Cooking took less effort because it used advanced technology and electronic implements rather than mallet and mortar and pestle. Dishes introduced pure juices and organic foods free of pesticides. Bocuse and his enterprising followers evolved into a rebel breed of kitchen artists and earned for Bocuse the title “Chef of the Century.”

The deconstruction of extravagant *cuisine moderne* (modern cookery) reached a peak of popularity in the 1970s, the heyday of weekly television kitchen star Raymond Oliver, a judge at the Paris Wine Tasting of 1976. Chic new-wave cooking schools touted just-picked local asparagus and vacuum-packed scallops cleverly arranged and moderately enhanced by subtle citrus zest and geometric stacks and mazes. A multinational eclecticism and interest in healthful eating

reduced bulk, calories, refined sugar and starch, and salt by stressing color, texture, and savor of native greens, fish, and poultry. For example, in Caribbean tourist meccas, cooked green bananas with chickpeas and kidney beans added variety and mouthfeel to salads. American steak houses offered a choice of wild rice, baby carrots and sugar snap peas, or baked sweet potatoes in place of the humdrum Idaho potato.

The emergence of innovative micro wave and convection ovens and heavy-motored food processors meshed with advances in Japanese cookery, a propitious marriage of two styles of delicate cookery that rejected overlayering with sauce. Japanese chefs elevated in importance fine mousses and puréed fruits and vegetables as bases for revamped dishes.

The World's Table

More gentrified than cuisine moderne, nouvelle cuisine philosophy embraced multiculturalism. A surge of market consciousness shed political posturing and military superiority in favor of the wonder and enjoyment of the world's trade goods and remote wineries. Critic Gault admired a generation of chefs who ventured into professional kitchens that eschewed the structure and dogma of old cuisine. Food experts avoided pretense and media puffery and networked out of mutual admiration. In "The Best of" guides to Beverly Hills, Chicago, Hawaii, Las Vegas, London, Los Angeles, New York, Paris, Provence, San Francisco, and Tuscany, culinary writer André Gayot directed gourmands to meals with flair.

From long experience assessing the world's kitchens and tables, Gault remained wary of the faults of new style, especially egotism, lapses in basic sanitation and technique, and loss of respect for traditional ingredients and regional favorites. He warned of rootlessness and fads and ridiculed tiny portions, undercooking, foodstuffs as decoration, and unpalatable blends of sugar and salt with strong spices. As early as 1960, classic food writer Elizabeth David expressed a similar skepticism of bizarre menus and flamboyant plating.

After Bocuse traduced the movement and returned to tradition in the 1980s, nouvelle cuisine lost some of its mannered menus, yet retained appearance, balance, quality nutrition, and infinite variety. For example, at the Papiamento

Restaurant on Aruba, owner Eduardo Ellis advertised home-raised herbs, papaya hot sauce, and chicken and shrimp kebabs cooked on the traditional island coalpot. Wolfgang Puck, an Austrian food whiz and author of *Modern French Cooking for the American Kitchen* (1980), introduced the caviar and salmon pizza at Spago, his Beverly Hills landmark. The core beliefs of French radical cookery remained vigorous in fusion cuisine, Third World diets, Tex-Mex, culinary tourism, and the local, artisanal, and health food movements.

See also: Beard, James; Child, Julia; French Diet and Cuisine; Japanese Diet and Cuisine; Kebabs; Restaurants; Taillevent.

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Nutrition

Nutrition entered human concern in early Indian, Chinese, and Middle Eastern scriptures, which characterized what types of food strengthened the body and protected it from illness. The book of Leviticus (1440 B.C.E.), the Chinese *Zhouli* (*Chou-li, Rites of Chou*, compiled ca. 1116 B.C.E.), and the Indian Ayurveda (after 3000 B.C.E.) contain injunctions about selecting food and drink, hygienic storing and cooking, and food combinations to eat at a single sitting. Like the doctor or herbalist, the cook had to balance cold with hot, sweet with sour, and animal products with herbs, vegetables, grain, and fruit to avoid nutritional cancellations. The devout avoided banned items, as with wine and pig flesh, both forbidden by Koranic injunctions.

Other cultures followed their own concerns for right diet, such as the Hua of Papua, New Guinea, who stressed that ash should be removed from foods cooked in embers. Nigerians limited fruit by gender, thus denying males citrus fruit, mango, and papaya, which natives considered feminine food. Tanganyikans forbade eggs in the female diet to prevent stillbirths and twinning. In West Africa, meat was a privilege of males. Wives and daughters ate only small bits of the daily meat purchase. A similar custom in India diverted all fresh milk to boys, depriving girls of calcium and vitamin D.

Lack of nutrients in the diet pervades human history in periods of harsh weather and drought as well as during famines, pestilence, and sieges. One example from the journal of teenage writer Zlata Filipovic, titled *Zla-ta's Diary* (1994), records the hardships of Bosnia in 1993 during the ethnic cleansing of Muslims from Sarajevo. Reserving limited fuel for cooking, her family ate humanitarian relief packets containing tasteless white feta cheese and black market canned meat sold at outrageous prices, but little bread and produce and no fresh milk to balance intake.

Forensic studies of such meager diets in human coprolites, mummies, and skeletal and tooth remains attest to both disease and deficiencies as causes of death or contributors to crippled bodies and impaired lives. During fluctuations in the Nile's overflow in ancient Egypt slaves were the first to succumb to a grain shortfall. The cereal-rich diet of the early Greeks threatened social stability because of periodic grain shortages. In 328 B.C.E., one such dearth forced authorities to distribute free barley to house holders to prevent starvation and rebellion.

To broaden nutritional sources, early peoples ate unpalatable, unappealing, or taboo foods, even human flesh. Over long periods, the Chinese stored eggs, which developed into a national delicacy. Eskimo families, who enjoyed green vegetables during a limited period annually, traditionally ate moss and other plant material extracted from the craws of birds or stomachs of mammals. The Maori, who faced erratic supplies of foodstuffs, lined urns with ferns and stored corn that degenerated into *kanga pi-rau*, a foul-smelling residue. In the Caribbean, galley cooks discovered that they could keep sea turtles alive on board as a source of nutrition in sailors suffering scurvy, a deficiency of ascorbic acid.

Wellness Awareness

During the late Middle Ages, medical experts recognized the result of an inadequate or unbalanced diet, especially among the lower class and slaves. According to Abd al-Latif al-Baghdadi, an early-thirteenth-century Arab physician visiting Egypt during a famine, mothers who fed children only chickpeas and white bread caused bone and tooth malformation, dwarfism, and sickness.

The Renaissance increased awareness of the effects of food choices on wellness. The sixteenth-century Italian nutritionist Alessandro Trajano Petronio, author of *Del Viver delli Romani et di Conservar la Sanita Libri Cinque* (*Five Books on Roman Food and on Preserving Health*, ca. 1585), recommended to plebeian cooks a regimen of health foods, namely, lupines, sprouts, vetch, wild cherries, and cattails. The latter called for boiling, frying, and dressing in garlic sauce.

Nutritional guides proliferated during the seventeenth century. To settlers of North America, reformer and moralist William Vaughan penned *Directions for Health Both Naturall and Artificial* (1617). When he immigrated to Newfoundland in the 1620s, he inveighed against alcohol, which he denounced for deforming fetuses. His contemporary, Salvatore Massonio, author of *Archidipno: Overo dell'Insalata e dell'Uso di Essa* (*The Best Banquet: The Salad and Its Uses*, 1627), advised cooks to serve fresh salads and dress them with herbs, vinaigrette, and salt. He promoted kitchen gardening by advocating the eating of crocus and nasturtiums. Later in the century, François Massialot, author of *Le Cuisinier Royal et Bourgeois* (*The Royal and Middle-Class Cook*, 1693) lauded the New World turkey and provided a recipe for stuffing and instructions on roasting and garnishing the protein-rich bird.

Malnutrition in the Western Hemisphere flourished amid racism, slavery, and genocide. In an autobiography written in 1912 about Washington State Salish life, Mourning Dove, the pseudonym of Christine Quintasket, reported on the annual hunger that struck native families in February. While succoring the poor and welcoming neighbors, her family watched their parfleches (storage envelopes) flatten. Her mother began a drastic rationing of food: She served meals only when necessary and allotted tiny amounts to herself while she fed her children.

Mourning Dove grew bitter at the Native American injunction that adults eat first, protesting the bone and gristle left for children to gnaw.

A popularizer of the faddish term *nutrition*, U.S. President James Garfield introduced a kitchen routine that yielded well-cooked, healthful dishes, milk, coffee, and pennyroyal and catnip tea. A learned man and voracious reader, he and his wife, Lucretia Rudolph Garfield, reared seven children on wholesome bounty. The White House bent toward a well-balanced diet came to an end with the inauguration of epicure Chester A. Arthur in 1881. Only months after his return to private life, Arthur died of Bright's disease resulting from a lack of vitamin D. One critic blamed his rapid decline on inadequate exercise and a diet dominated by terrapin and fine wines.

Nutrition as Science

The populist spirit and zeal for reform in the 1800s and early 1900s produced sensible as well as bizarre regimens for upgrading nutrition. A leader of domestic science, Wilbur Olin Atwater, an agricultural chemist at Wesleyan University, outlined a diet based on the scientific analysis of foods. At Yale University, he raised American standards of agricultural chemistry and quantified the heat produced by the body's oxidation of sustenance. From his findings, Atwater charted the caloric value of foods and made world studies of how nations profit from labor maintained by a healthful diet. His conclusions supported German studies of nutrition and metabolism and remain the standard for calorimetry. His summation of the American diet and his food composition tables, distributed in 1895 from the U.S. Department of Agriculture (USDA), formed the bases of scientific food selection and levels of nutrition used at the Boston Cooking School, cook Fannie Farmer's pioneering effort in training poor house wives to buy the most nutritious foods that their families could afford.

Guilt-producing media ads tapped the homemaker's growing unease about family nutrition and suggested techniques and products to improve diet, including canned milk and bananas, a new commodity on the global market. Katharine A. Fisher, director of the Good House keeping Institute, issued articles directing homemakers on the importance of expending cash and energy

preparing menus preplanned by nutritionists. In the March 1925 issue of *Good Housekeeping*, Evangeline Downey Tector presented a compelling argument for body-building food to supplement children's diet. Her upbeat tone and cheery attitude toward the mother's role in strengthening the family allied with simple photos of the best foods for health, including bread, cereal, dried and fresh fruit, eggs, peas, and spinach.

Women's magazines also distorted the nutritional picture with disinformation and unsubstantiated claims. In 1926, advertising by the Kitchen Craft Company of West Bend, Wisconsin, touted a waterless multistage cooker, a latch-lidded kettle holding numerous small dishes of food, as the answer to mothers seeking to preserve vitamins and minerals in entrées. In addition to citing dietitian Milo Hastings as a promoter of the device, the company guaranteed flavorful, healthful meals. The article concluded with a twist in logic—a claim that the cooker was essential to household fitness.

Nutrition as Entitlement

For those lacking the resources to keep their families adequately fed, the responsibility fell to governments and charities. During the Australian Depression of 1929, when unemployment put families on the edge of starvation, individuals lined up for handouts from the Benevolent Society. Volunteers supplied bread, condensed milk, fruit jam, syrup, and tinned meat at depression food shelters throughout New South Wales. As the Depression worsened, the society handed out food coupons at labor offices and police stations. By 1931, the governor-general volunteered the state as a dispenser of unemployment relief.

During better times late in the 1930s, mounting concern over vitamins and minerals sent meal planners to women's magazines for data on how to supplement the diet with fish. As explained by Walter Eddy, director of the Good Housekeeping Bureau of Foods, Sanitation, and Health, before the addition of iodine to salt, seafood was the best source of iodine to prevent goiter. In a magazine article specifying goitrous and nongoitrous areas of the United States, he compiled a chart of iodine-rich fish to help the home cook with selection. At the top of the chart, lobster contained 11,590 parts per billion (ppb) of iodine and

clams 6,200 ppb, contrasting mackerel at 330 ppb at the bottom of the list.

During World War II, commercial rice processors began parboiling rice to produce a nutritious and stable food for Allied soldiers. The method preserved nutrients that milling would have wasted. By maintaining niacin and vitamins B1, B3, and B12, the military prevented beriberi and pellagra, both deficiency diseases that sap soldiers of efficiency and strength. A bonus from the parboiling process was a lengthened shelf life for rice, which hardened and resisted moisture damage during storage in tropical military commissaries.

In the post-World War II era, hunger grew rampant worldwide. In a press release dated February 6, 1946, President Harry S. Truman encouraged Americans not to grumble if they did not find grocery shelves stocked with the bread, meat, cheese and other dairy products, and salad dressings they preferred. He exhorted complainers to accept inconveniences as a small price for saving lives and mitigating suffering in liberated countries. The president declared stable nutrition a firm basis for peace. On June 4, 1946, he signed the National School Lunch Act, which supplied cafeterias with commodity foods, feeding the undernourished while guaranteeing farmers a venue for their goods.

In defeat, the Japanese faced national hunger. In May 1946, food allotments in Tokyo averaged half of official ration allowances. The resulting daily consumption reached only about 520 calories per person, leaving the Japanese to forage for wild food. Japanese dieticians worried about effects on health after rice consumption fell to 66.6 percent its previous level. Another deterrent to wellness, grain-polishing machines stripped the husk and germ to create a *kaku-mai* (whitened rice). The loss of the germ destroyed the layer rich in vitamin B1 and increased the threat of beriberi and heart and nerve atrophy. To rescue a generation from irreversible damage, the Japanese government began a propaganda campaign on the value of unrefined rice or blends of rice and barley.

Denis Parsons Burkitt, an Anglo-Irish surgeon and medical missionary, asked similar questions about the typically bland, over-refined Western diet. From a study of appendicitis, colitis, colon cancer, constipation, diverticulitis, gallstones, heart disease, hemorrhoids, hiatal hernia, and varicose veins in industrialized countries during the late 1960s, Burkitt evolved a theory that dietary fiber combats diseases peculiar to nations where food comes to the table devoid of fruit peels, husks, seed coats, and whole grains. Against the food habits of an

overweight, white-bread world, he lectured on the selection and preparation of foods rich in unabsorbable roughage and published 300 articles and a book, *Western Diseases: Their Dietary Prevention and Reversibility* (1994). His impe

Basic Nutrients and Consequences of Intake Deficiency

Basic Nutrient	Health Benefits	Consequences of Intake Deficiency
calcium	bolsters nerve and muscle tissue, builds bones and teeth	osteoporosis, rickets
carbohydrates	energizes	malaise
chromium	balances weight, enhances metabolism, tones muscles	glucose intolerance, muscle loss
copper	pigments hair and skin, strengthens blood and nerves	anemia, weakened bones
fats	energizes	anemia, fat deposits of the liver, impaired healing, reduced platelet count, scaly dermatitis
fiber (hemiceilulose)	aids digestion	colitis, constipation, hemorrhoids
fluoride	strengthens bones and teeth	dental caries
folic acid (foliacin)	aids digestion, forms red blood cells	anemia, birth defects, bleeding gums, diarrhea, insomnia, stunted growth
iodine	helps thyroid gland regulate energy	cretinism, goiter
iron	allows blood to carry oxygen	anemia, breathlessness, fatigue, headache, weakness
magnesium	aids muscle and nerve activity, energizes, strengthens bones	confusion, loss of appetite, muscle cramp, nausea
	bolsters nerve and	

phosphorus	muscle tissue, builds bones and teeth	anorexia, malaise, skeletal pain, weakness
potassium	balances fluids, transmits nerve impulses	impaired peristalsis, loss of appetite, malaise, nausea, unusual behavior, weakness
protein	builds cells	kwashiorkor, marasmus
selenium	activates enzymes, acts as an antioxidant	cardiopathy or weak heart muscles, muscle pain
sodium	balances body fluids	diarrhea, excessive urination, headache, muscle cramp, vomiting, weakness
vitamin A (retinol)	builds resistance, to infection, prevents night blindness	deformed cornea, mucosal atrophy, night blindness, weak tooth enamel
vitamin B1 (thiamine)	aids normal growth, digestion, and memory	cardiomyopathy, constipation, encephalopathy, fatigue, indigestion, loss of appetite, nervousness, neuropathy, poor memory
vitamin B2 (riboflavin)	promotes digestion and growth	cracked lips, dizziness, eyestrain, inflamed tongue, light sensitivity, retarded growth, scaly skin
vitamin B3 (niacin)	aids appetite and memory	depression, diarrhea, impaired memory, loss of appetite, skin pellagra
vitamin B6 (pyridoxine)	energizes, aids digestion	confusion, depression, diarrhea, fatigue, infantile convulsion, irritability, rash
vitamin B12	aids memory and red blood cell formation, energizes	beriberi, indigestion, cardiac damage, anemia, paralysis, numbness, pellagra
vitamin C (ascorbic acid)	promotes oxidation and healthy blood vessels, bones, and teeth	bleeding gums, bruising, fatigue, scurvy
vitamin D (calciferol)	boosts intestinal absorption, develops teeth and skeleton	bowlegs, kidney failure, osteoporosis, rickets, skeletal malformation, softened skull
vitamin E	acts as an antioxidant, bolsters	anemia, low birth weight, muscular atrophy, nerve deterioration, poor fat

(tocopherol)	antioxidant, boosts reproductive system	atrophy, nerve deterioration, poor fat absorption, reproductive failure
vitamin H (biotin)	aids metabolism	toxicity
vitamin K (phylloquinone)	enables blood to clot	hemorrhage, impaired healing
zinc	balances insulin, boosts immune system, promotes healing	anemia, female infertility, hair loss, loss of taste, slow healing, stunted growth

tus toward supplying pantries with bran cereal, fruit, nuts, wheat germ, whole wheat breads, and vegetable sources of roughage revived interest in Stone Age eating habits.

Standards

In 1993, the U.S. Food and Drug Administration further assisted home cooks in selecting nourishing foods by issuing guidelines for mandatory nutritional labeling on all edibles. As of May 1994, labels had to follow a model that listed serving size, servings per container, calories, calories from fat, total fat, saturated fat, cholesterol, sodium, carbohydrates, dietary fiber, sugars, and protein. In addition, manufacturers had to quantify vitamin and mineral content in terms that the consumer could understand. Amounts appeared in grams or milligrams and by percentage.

In February 2001, after learning that Philadelphia was America's fattest city, Chef Joseph Shilling, director of the school of culinary arts at the Art Institute of Philadelphia launched a campaign to improve food selection among urbanites. The city's fast-food restaurants and street-vended pretzels and cheese steaks produced an obesity rate of 29 percent. Shilling began educating cooks on healthful menu items, revamping recipes to decrease fat content, and instructing waiters to point out wise choices to diners. He also recommended portion reduction and an increase in fruit and vegetable consumption.

Raising Sustenance Levels

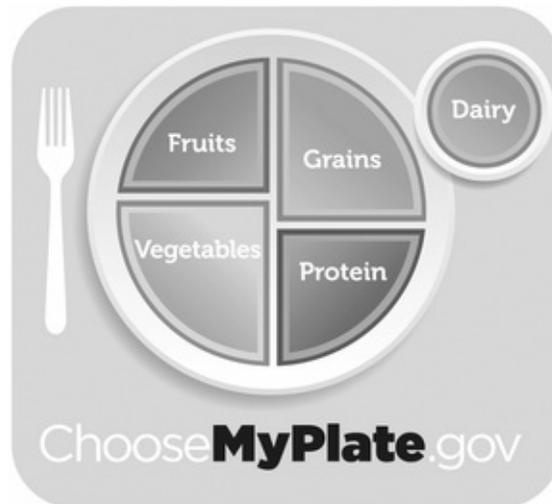
To bolster diets farther south without using pills or capsules, after 1960, the Institute of Nutrition of Central America and Panama (INCAP) supplied cooks with Incaparina, a high-protein flour made from cottonseed, corn, and sorghum and containing yeast, calcium carbonate, and vitamin A. Similar to the groundnut flour that cooks in India emulsify in water, the powder supplemented baking without altering texture, taste, or appearance. In the Philippines, school lunch providers baked Nutribuns, a low-cost, enriched biscuit that furnished local children with one day's nutrients. The Agency for International Development contracted with American food processors to extend nutrition in foodstuffs among have-not nations:

- California Packing manufactured a protein drink for East Africans' tables.
- Coca-Cola marketed a soy milk product in Brazil.
- Dorr-Oliver devised a cottonseed product to enrich the diet in India.
- General Mills supplied Pakistan with a cottonseed-soy food .
- International Milling enhanced nutrients in wheat foods for Tunisia.

- Krauss Milling fortified corn-based foods for Brazil.
- Monsanto produced Puma, a banana-flavored soya product sold in Guyana.
- Pillsbury supplied Frescavida, a protein beverage served in El Salvador.
- Swift dispatched a soy milk product to Brazilians and a protein drink to India.

In 2001, Walter Willett, chair of the department of nutrition at Harvard School of Public Health, published *Eat, Drink, and Be Healthy: The Harvard Medical School Guide to Healthy Eating*, which overturned the proportions of food advised since 1992 by the USDA, an agency he charged with promoting agriculture at the expense of public health. Willett denounced data advising homemakers to serve six to 11 portions of bread, cereal, pasta, and rice daily, blaming a heavy carbohydrate diet for causing diabetes, obesity, and early death. To spare waistlines at a time when 61 percent of Americas weighed too much, Willett called for a reduced emphasis on red meat, whole milk, and margarine

and championed beans, nuts, and oils from canola, corn, olives, peanuts, soy, and sunflowers. Citing studies of health professionals, his advice to cooks stressed more fruit, vegetables, eggs, fish, and poultry.



The U.S. Department of Agriculture released a new healthy eating guide, called “My Plate,” in 2011. Replacing the more complex pyramid diagram, “My Plate” depicts the five major food groups in healthful proportions (with additional recommendations). (*Agriculture Department/Associated Press*)

In June 2011, the USDA issued MyPlate, the second update of the food pyramid, a pictorial guide to healthful consumption. In place of a triangular arrangement, the logo took the shape of a plate roughly divided into quadrants featuring grains, fruit, protein, and vegetables and a cup containing dairy products. A list of recommendations boosted citizen awareness of the value of fruits and vegetables and the benefits of eating whole grains and lean protein and drinking skim milk. Key to the simplified chart are suggestions to eat less and to choose water over sugared beverages.

See also: Coprolites; Durante, Castor; Famine; Liebig, Justus von; Medieval Diet and Cuisine; Paleolithic Diet; Pickling; Poultry; Rumford, Count; Seaman’s Diet and Cuisine; Snack Food; Trans Fat; Voegtlin, Walter L.

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[Nuts and Seeds](#)

Consumers from cave dwellers to vegans and raw foodists have looked to nuts and seeds for convenient sources of energy, oil, and protein. Shell fruits earn their place in the human diet for their antioxidants, minerals, omega-3 and-6 fatty acids, and vitamins B1, B2, B3, and E. They satisfy hunger and vary the food intake of patients suffering from diabetes, heart disease, high cholesterol, immune deficiency, and premature aging.

High fiber makes nuts easy to digest. For their mouthfeel and energy boost, they contribute to the appeal of salads, sauces, soft drinks, and syrups and to Pakistani curry, filbert (or hazelnut) butter, pistachio halvah, Waldorf salad, and Thai cashew chicken, all recipes requiring bulk. The confection industry relies on nuts for taste and crunch, a factor in the production of almond amaretti, baklava, Chinese moon cakes, granola, Israeli coated peanuts, peanut brittle, and pralines.

History

From 778,000 B.C.E. on the shores of Lake Hula, Israel, hominins used anvils and stone hammers to crack shells and extract the kernels from acorns, almonds, pistachios, and water chestnuts. East Asians from Siberia south to Korea, Japan,

and India cultivated the foxnut, the seedpod of a water lily. Indian cooks cooked the pods in porridge and stir-fried them in oil until they popped. From 14,000 B.C.E., Japanese foragers soaked acorn kernels in ponds to leach out bitter tannins and release sweetness.

Additional historic evidence of nuts as food occurred in the British Isles in 7000 B.C.E., when hazelnuts provided a major source of protein to vegetarian clans. The peanut nourished Peruvians as early as 5600 B.C.E.; in 5000 B.C.E., the mongongo nut yielded a dietary staple for San Bushmen of the Kalahari. From 4000 B.C.E., northeastern Chinese propagated the sweet chestnut, which orchardists advanced to 300 cultivars. The Bedouin of Libya and Egypt collected seeds from the wild gourd to make bread. In 1325 B.C.E., burial parties interred Egypt's king Tutankhamen with stores of Turkish almonds to delight him in the afterlife.

Nuts and seeds have fed Australian Aborigines, forest Indians, nomads, Polynesian and Portuguese sailors, polar explorers, and armies on the march with a handy power snack. Assyrians treasured sesame seeds as a sacred food. Travel writers Marco Polo and Ibn Battuta found contented mealtime chewing of betel nuts in China and India. Persians cultivated the pistachio in desert soil high in saline; British and Scottish beech hedges produced fragrant mast for smoking beer and cheese. Along the Amazon and Orinoco valleys, Bolivians and Guianans gathered Brazil nuts in the wild, revealing clusters of 8 to 24 kernels in one large fruit.

Ancient Greeks stockpiled nuts and seeds as siege food and relied on beechnuts to feed victims of sieges. Romans tossed almonds and coins at weddings as symbols of fertility and prosperity. Greeks and Iberians developed recipes for acorn flour, which also became a dietary staple for the California Miwok. To protect them from squirrels and worm infestation, the Miwok cached acorns in baskets, much like the Cherokee and Creek stored hickory nuts. To ready acorns for use in bread and porridge, cooks ground kernels into flour and leached out tannins through sand colanders.

In the Middle Ages, Silesians preferred beechnut puree instead of butter from dairy animals. Nuts took prominence on the church calendar with the *marron glacé* (candied chestnut) served in France at Christmas and roasted chestnuts honoring the feast days of Saint Martin and Saint Simon. Under the medieval system of commerce, public sale of milk met with strong buyer skepticism. A

safer street purchase, almond or walnut butters and liquids, the run off of grinding, remained fresh over a longer period.

Nuts remained stable food crops in the Renaissance, when cookery became more complex and extravagant. French pastry shelves added almonds to macaroons and marzipan. In 1600, Portuguese sailors transported the peanut from Brazil to Africa. Unlike corn and sorghum, peanuts flourished in poor soil, while serving as a nitrogen fixer, and became a sustainable crop.

In the nineteenth century, an inventive vegetarian in Battle Creek, Michigan, Almeda West Lambert, found ways of replacing animal protein with nuts. In *The Guide for Nut Cookery* (1899), she proposed blends of nut butter and meal with bread crumbs, eggs, herbs, and spices to imitate fish and turkey. Her concoction, which she dubbed “nutmeato,” remained viable for three decades, along with “nutgrano,” a blend of ground kernels with grains. One recipe for cereal and peanut coffee began with the roasting of ground peanuts with cornmeal, malt, and wheat bran.

In World Cuisine

Nuts and seeds remain big business in the world food trade, from Georgia pecans to Australian macadamias. African growers readily sell peanuts to the poor for flour, porridge, soup, and salted snacks. In Burkina Faso, Cameroon, Congo, Mali, Zambia, and Zimbabwe, consumers look to the farinaceous Bambara groundnut for a cash crop, daily sustenance, and a solution to chronic malnutrition. Malian and Nigerian women enrich their families by selling peanut pancakes and roasted nuts on the street.

Because nuts can disable the body’s immune system, concern for lethal allergies reduces the availability of nuts in public venues. School cafeterias formulate rules to protect the vulnerable from accidentally ingesting nut products. Food manufacturers voluntarily label to advertise nut-free recipes and to warn of nuts in processed products. And the problem of food reactions has proved thorny for the transportation industry. In June 2011, Air Canada banned nut products from catered meals and snacks, a ruling that inconvenienced the vegans and raw foodists who rely on nuts and seeds for protein. Irish food

regulators have taken a stand against overlabeling by informing consumers that too many warnings reduced the number of food choices for people with allergies.

See also: Allergies, Food; Caching; Ibn Battuta; Medieval Diet and Cuisine; Nomad Diet and Cuisine; Wild Food.

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O

Obesity

A preventable condition triggering arthritis, cancer, diabetes, kidney and liver disease, reflux, and sleep apnea, obesity refers to the accumulation of excess body fat of 20 percent or more. Overeating is the chief cause. A preference for energy-dense convenience foods from drive-throughs and vending machines depletes the diet of fiber and water while imposing a regimen of fat, salt, and sugar. The chronic increase in body mass taxes the muscles and skeleton, requiring undue expenditure of energy to function. A general malaise from inactivity exacerbates back pain and gout and generates congestive heart failure, hypertension, and varicose veins.

Around 23,000 B.C.E., Stone Age civilizations extolled the voluptuous female figure as a symbol of satiety and fertility. Mother divinities from Anatolia, Mesopotamia, and the pre-Columbian Americas honored the corpulent female as an emblem of stored nutrients and longevity for the clan. In sub-Saharan Africa, Mauritanian, Nigerian, Tanzanian, Ugandan, and Zimbabwean grooms rejected slim women as brides until potential brides entered a period of weight gain from pampering and selective eating.

After the fifth century B.C.E., Arab, Chinese, Egyptian, Greek, and Indian medical experts identified obesity as a harbinger of decreased fertility, catastrophic illness, and sudden death. Greek and Roman stage comedy ridiculed Obesus, the roly-poly stereotype, as a glutton, a figure stigmatized by the Seven Deadly Sins of Christian dogma. Despite satire and sermons, caloric intake increased during the Renaissance. As a sign of military preparedness, the Industrial Revolution made available the food to fatten up Europe's armies and prevent another debacle as devastating as the Napoleonic Wars.

Lifestyles became less strenuous in the late 1800s with the introduction of steam engines, which boosted the production and transportation of such processed food as Indian curries and pudding mixes. German chemist Wilhelm

Normann's invention of trans fats— hydrogenated lard and margarine— in 1902 stabilized food for distribution and storage on ware house shelves.

At the end of World War II, American influence on world diet precipitated overall increases in height and weight. For families, obesity precipitated hard labor, thrombosis, and stroke in pregnant women and, in their offspring, birth defects, and neonatal problems, including stillbirths. In the 1950s– 1970s, corpulent adults chose bariatric stomach stapling and gastroplasty, a costly reengineering of the alimentary canal that permanently limited food intake.

Obesity worsened in the late twentieth century because of higher daily caloric intake, notably among Nazi death camp returnees, urbanized Pima of Arizona and Mexico, and Third World survivors of child starvation. Computers and video games replaced televisions as causes of a sedentary lifestyle. Legislative incentives to American agribusiness in the 1970s decreased the cost of corn, rice, soy, and wheat in comparison with the price of fresh produce. By 2011, U.S. Department of Agriculture investment in commodity crops reached \$25 billion annually. Thus, empty calories cost less, tempting the poor to spend food dollars on beer, carbohydrates, and junk food. The problem extended to the school lunch program, which subsidized cafeterias for purchasing fried potatoes and pizza rather than broccoli, juices, and salad greens.

As opposed to the food consumption in developed countries, sub-Saharan Africans maintained the lowest levels of fat from an average diet of 2,176 calories per day. In contrast, the United States supplied 3,654 calories to the daily intake, much of it from energy-dense fat, fructose, and sucrose in take-out foods. The alarming spurt in average body weight influenced food producers to market such low-caloric foods as diet cola, fat-free milk, rice cakes, Ry-Krisp, and Slim-Fast protein shakes, a regimen for eating to lose weight. One herbal drug known as fen-phen, a combination of the stimulant ephedra and the mood-elevating herb Saint-John's-wort, attempted to trick the body into dieting by raising the level of chemical serotonin in the brain, thus creating the illusion of contentment.

In this same period, portion size burgeoned in restaurant servings, micro wave dinners, and packaged goods, resulting in the “super-size” syndrome. Media advertising featured the high-fat, high-sugar meal as the American way. Binge eating and overconsumption of carbohydrates from sweet beverages, fast foods, and potato chips increased the trend to fat Americans, particularly low-income

women in unskilled jobs. Other causes— alcoholism, antidepressants, antismoking drugs, and steroids—contributed more weight and more stress, a source of nervous eating.

Authorities became concerned for children and teens, whose body fat accumulation threatened overall health and longevity. In the 2010s, First Lady Michelle Obama set an example of exercising, growing a White House garden, and eating wholesome meals. By 2011, obesity reached 30 percent and above in Alabama, Arkansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Oklahoma, South Carolina, Tennessee, Texas, and West Virginia, largely from an average intake of 200 unburned calories per day. Over a span of 15 years, meanwhile, native Hawaiians doubled their rate of overweight. Black adults topped the scale at 40 percent obese, followed by Hispanics at 35 percent.

According to the World Health Organization, as of 2011, more than 2.6 million people worldwide died annually from poor diet and sedentary habits. Overweight affected nearly half of all Malaysians and Qataris, more than one third of Kuwaitis, one fourth of Canadian children, and 20 percent of the world's total population. According to the U.S. Centers for Disease Control, obesity, which plagues 29.1 percent of adult Americans, drained the country of dollars for medical care. Role models in Japan and South Korea average only 3.2 percent overweight, giving evidence that East Asian diet protects consumers from a leading preventable cause of death. While theater and media ads hyped new sources of empty calories, health initiatives by the National Heart, Lung, and Blood Institute; the National Institutes of Health; and the World Health Organization published practical nutritional advice on attaining ideal weight.

See also: Athenaeus; Fast Food; Herbs; Nutrition; Scandinavian Diet and Cuisine; Trans Fat; Voegtlin, Walter L.

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Oils

As a cooking medium, liquid cooking fats moisturize the tissues of edibles with a nutrient essential to braising, frying, and sautéing. Animal muscle meat— anchovies, bacon, beef roast, cod, ham, mutton, salmon, sardines— exude natural lipids that even browning and heighten natural flavors. Vegetable fats from almond, argan, avocado, canola, corn, and rice and the seeds of butternut squash, citrus fruit, cotton, flax, grapes, pumpkins, and rapeseed offer a range of stability and taste for kitchen use. Additional flavor derives from the nut oils of cashews, hazelnuts, pecans, pistachios, and walnuts. When permeated with citrus peel, garlic, herbs, and peppers, specialty oils heighten taste without adding extraneous bulk.

Historically, oils figure in all cuisines, particularly the expression of macadamia nut oil by Australian Aborigines and tropical cookery with calabash seed oil, which began after 6000 B.C.E. For some 5,500 years, the Mediterranean diet has showcased olive oil, first commercialized in 3500 B.C.E. by the Minoans of Crete. Egyptians, Greeks, and Romans valued black seed (*Nigella sativa*) as a curative oil used in bread and cake. In 3000 B.C.E., when Africans in the rain forests from Angola to Senegal were commercializing palm oil for the frying of yams, Egyptians stowed the emollient in a tomb at Abydos as a grave gift for the afterlife. During the same period, Egyptian consumers depended on caravan loads of olive oil from Palestine and Syria.

While flaxseed and safflower oil dominated Middle Eastern cookery in 2500 B.C.E., residents of Harappa in the Indus Valley relied on sesame oil for baking, a primary cooking fat that spread over Asia and Africa. In 2100 B.C.E., the Mexica began growing sunflowers for oilseeds, an agrarian advance that spread north to Arizona Indians by 800 B.C.E. To the south, Peruvians domesticated the peanut as an oil source before 2000 B.C.E.

Soybeans entered the lipid market in northern China in 1000 B.C.E., the same

time that Greek olive growers were capitalizing on the food oil trade. Within the millennium, olive farming was flourishing in Magna Graecia, Sicily, North Africa, and Provence as far north as the Helvetian Alps. The Romans dominated the olive trade, including fruit cured in oil and *chrism* (holy oil) revered in Jewish and Christian ritual for anointing priests.

National Cuisines

From the first century C.E., cooks in India expressed cooking fats from the oilseed turnip; brushed bread with ghee, a clarified butter oil; and boosted the pungency of fritters by frying them in mustard oil. Chinese and Japanese cooks valued tea seed oil for dressing and sauces and for low-fat stir-frying. Middle Easterners added flour and sesame seed paste to olive oil to produce hummus but sprinkled the oil lightly on foods because of the high cost of importing it by camel caravan. Muslim cooks relied on sesame oil, which also served as a condiment smeared on whole fish for roasting as a kebab and for the frying of samosas (turnovers).

West Africans turned the shea nut and egusi melon and watermelon to use as sources of cooking oils, all high in nutrition and protection from dietary cholesterol. In the 1400s, provisioners across the Levant and North Africa supplied caravans and cargo vessels with palm oil for cooking. In Russia, cooks replaced butter and lard during Lent with pine nut oil, which they added to bread dough as a preservative.

Among Aleutian Yupik, Makah, and Nootka of Vancouver Island, and the Dorset of Labrador and northern Quebec, the rendering of blubber from harp seals and stranded whales resulted in a multiuse oil for cooking, moistening dried caribou and halibut, and soaking bones for burning in stoves. Lipids preserved berries and, when mixed with snow, turned them into ice cream flavorings. As far south as Baja, Pacific Indians valued eulachon, salmon, and animal fats as a domestic flavoring or dressing for foods. Tlingit and Tsimshian exploited oil sources as a marketable item, which they sold at trade fairs.

Industry

After French brewer Nicolas Appert introduced vacuum canning in 1809, canneries packed tinned salmon in oil as a preservative and tenderizing agent. On the Upper Guinea shores in the 1830s, the French controlled the peanut oil industry and the English dominated palm oil trade. Hong Kong seized the advantage in the 1850s by profiteering on coconut oil brought from Southeast Asia to China and on return trade in peanut oil. In the 1860s, coconut oil from India, Indonesia, Malaysia, Mexico, the Pacific Islands, and Sri Lanka monopolized food oil marketing until palm and soybean extracts toppled sales. Near the end of the century, Russian food processors hybridized sunflowers to produce 50 percent more oil and turned their crops into Europe's more valued seed oil.

Peanut oil became a political advantage during the American Civil War, when Southern house holders replaced lard in pastries and olive oil in dressings with the regional product. After the invention of hydrogenation in 1902, Africa, China, and India profited from the peanut oil boom, which foundered during World War I, curbing the world supply of margarine. Argentina experienced a similar food shortfall in 1936 during the Spanish Civil War, when farmers began growing sunflowers to yield enough oil to replace embargoed olive oil in traditional recipes.

A subsequent shortage of coconut oil during World War II forced Malaysians to shop on the black market for coconut oil, which they used for cooking and lighting in lamps. The American margarine industry adapted to peanut oil as a substitute. Farmers sowed safflowers as a commercial experiment with a cooking oil that slowed digestion and promoted nutrient assimilation. In 1942, when World War II rationing limited the availability of butter, lard, and salad oils, homemakers accepted peanut oil, which remained free of government control. As a replacement for butter, margarine, and shortening, home cooks began using cooking oil in cakes and muffins in the 1950s. By the 1960s, the health food movement embraced peanut oil for its nutritional benefits in frying, processed foods, and salad dressing. Simultaneously, Canada joined China and India in commercializing rapeseed oil for use in cooking.

In 1961, Chicago investors Arthur E. Meyerhoff and Leon R. Rubin invented Pam, a gluten-and lactose-free cooking spray that maintained the qualities of cooking oil in light, low-calorie applications. The popular lubricant coated grills,

molds, and sauté pans and eased the assembly of blender and food processor parts. Demand for Pam and its imitators resulted in specialty sprays flavored with butter, canola, garlic, lemon, and olive oil for crisping potato and poultry skins. An offshoot permeated with flour created a nonstick surface on bakeware.

Today, energy experts comb the world for biofuel substitutes for dwindling petroleum. Among these are oils extracted from the coyote melon (*Cucurbita palmata*) and jojoba of the American Southwest and Mexico and the shea nut cultivated by the Banda of central Africa as well as waste vegetable oil from fast-food restaurants and food-processing factories. As a food source, vegetable oil constitutes a profitable food industry worldwide, notably the oyster nut (*Telfairia occidentalis*) in Mozambique and Tanzania, samphire (*Salicornia europaea*) in Pakistan, coconut oil on the Philippine island of Samar, and palm oil from the Caribbean and Kenya. Malaysia exports 70 percent of global palm oil, followed by production in the Ivory Coast, New Guinea, the Philippines, the Solomon Islands, and Thailand.

See also: Cod; Fish and Fishing; Lapérouse, Jean François Galaup; Nuts and Seeds; Olives and Olive Oil; Trans Fat; Whaling.

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Olives and Olive Oil

A nutritional foundation in Europe, Africa, and middle and central Asia, the olive tree produces both fruit and oil as well as leaves for tea. A compact, long-lived

evergreen native to Crete, Cyprus, Israel, Lebanon, and Syria since before 5000 B.C.E., the feral olive (*Olea europaea communis*) is the oldest in world agriculture, followed by the date palm, fig bush, and wine grape. The olive tree can survive for 3,000 years, even on the least arable land in drought conditions across Algeria, Ethiopia, Kenya, Morocco, Tunisia, and Uganda. It begins bearing in its fifteenth year, reaches a height of yield in the fortieth year, and slows productivity after 140 years.



Greek workers harvest olives by shaking the tree boughs and collecting the fallen fruit, typically in midwinter. Olives and olive oil, held sacred in ancient Greece, remain essential to the cuisine and economy of the eastern Mediterranean. (*Bastian Parschau/Getty Images*)

For millennia, the olive has provided growers with cooking and lamp oil, food preservatives, ritual oil, soap, unguent, and wood. The Minoans profited from the olive trade as early as 3500 B.C.E. Archaeologists attest to the centrality of olive oil to Cretan and Turkish daily life by the number of storage amphorae, decantation basins, and milling stones that survive from prehistory. So sacred were olive groves in Attica that the Athenians passed laws forbidding the hewing of olive trees under pain of death or exile.

The tree appears so frequently in frescos, funerary art, classical literature, and

scripture that it attests to its own prominence in Middle Eastern diet and cuisine. Baskets of olives and urns of oil accompanied the Egyptian dead to their tombs. By 2000 B.C.E., oil from Syria was worth five times its weight in wine. Hippocrates and later healers chose olive oil as an aphrodisiac, a protection of the stomach from alcoholic excesses, and a curative for burns, dandruff, dry hair and skin, earache, and muscle ache.

Mediterranean Staple

A sacred dietary staple rounding out a triad with bread and wine, olives symbolized the elements of the settled life— bounty, peace, and wellness. In the prophet Isaiah's visions of a Hebrew savior, he foresaw the birth of Christ as a branch sprung from the root of Jesse and house of David, the parent tree. During King David's reign (ca. 1000– 970 B.C.E.), he posted security guards around his olive groves and ware houses.

The mechanical press, invented around 1000 B.C.E., raised profits for Iberian and Phoenician growers, who touted their terroir for distinct flavor, quality, and viscosity of oil. Unguent and olive branches took prominence in religious anointings in the Bible and Koran, for cleansing newborns, at gravesites for bathing and mummifying the dead, and, from 776 B.C.E., at Olympic contests and Panathenaic Games. Parents honored the birth of a child by planting an olive tree, a symbol of longevity for the family and its progeny.

Commercial propagation in Greece after 700 B.C.E. involved pruning, manuring, rooting suckers, and grafting cultured stock to the wild olive tree. Where conquest took soldiers, the olive accompanied them— as far west as Iberia and east to India and Pakistan. Bountiful crops enriched growers on Chios and Melos. Commercial olive growing supported farmers in Crete, Greece, and Israel and developed fans in England, France, Germany, Romania, and Russia for the large Greek kalamata, the longish green French Picholine, and the greenish-purple Manzanilla de Jaén from Spain. Pressing and pickling in brine or lye began in late fall. Shippers sealed both fruit and oil in amphorae for trade around the Mediterranean.

Through the Ages

The Greeks and Romans turned olives into a food industry by associating the oil with refined dining. Snobbish diners maintained that only barbarians preferred oil from animal sources. Merchants touted olive oils scented with celery, cress, fennel, juniper, mint, sage, and sesame. The Persian leader Xerxes's attack on Athens in 480 B.C.E. concluded with the burning of the olive grove on the Acropolis, a symbolic gesture of contempt for Greek power and superiority.

Colonizers spread cultivation to Massilia in southern France and Tunisia, where Romans hoped to tame the Berbers by making them arboriculturists. Shippers designed vessels solely for transporting oil. As an act of dominance in Palestine, during the Emperor Titus's assault on Jerusalem in 70 C.E., he ordered Roman legionaries to fell the trees. A half century later, the Emperor Hadrian's mint sculpted a gold aureus coin with the olive branch in the hand of the goddess Pax (peace). A subsequent silver denarius from around 134 C.E. pictured the olive branch in the hand of Hispania.

Because crushing olives for oil required cool temperatures, the first fruit processors set up presses in caves and basements. In the early Middle Ages, the invention of the screw press simplified a labor-intensive job. The shaft settled on top of mash sacks, from which oil trickled into a catch basin. Under Moorish influence after 711 c.e., the province of Spain enhanced the olive trade by grafting Arabian varieties to Iberian stock, which includes 250 olive species. Despite the high price of imported products, cookbooks to the end of the Renaissance proclaimed olive oil superior to butter and lard in cuisine for its subtle flavor and blendability.

In the New World, Franciscan and Jesuit fathers planted mission banana trees and olive groves in Alta and Baja California in the mid-1700s and, by 1795, established stone mills and screw presses to obtain oil. Commercially, Argentina, Arizona, Chile, Mexico, and Peru tapped small markets for oil and fruit. In the early nineteenth century, Oceania acquired olives from Australia and New Zealand, where growers planted stock from Brazil, France, and Sicily.

A global demand arose in the late 1800s, when cookbooks elevated olive oil over pork lard. In 1896, immigrant growers Carlo, Ferdinando, and Raffaele Costa left Genoa for Cape Town, South Africa, and joined the exploitation of the olive

for food and oil. Carlo Costa advanced to Zimbabwe to launch his own groves. During the Spanish Civil War, bread, oil, and olives sustained the citizenry throughout food shortages.

Health Effects

In the 1960s, the Spanish government promoted exports of olive oil in exchange for American soy products. The effort coincided with health research that acclaimed olive oil as the most digestible of edible fats. American and European advisories revealed the value of olive oil to the cardiovascular system, generating enthusiasm for new orchards and their yield.

The survival of ancient orchards has figured in contemporary international conflict, notably the Israeli bulldozing of trees in Palestine from 1998 to the early 2000s. In an effort to rob the Spanish of their historical role in olive cultivation, some Italian entrepreneurs have imported cheap oil, herbed oil, and olives stuffed with anchovies or red peppers and labeled them in Italian, implying to consumers that the best grades came from Italy. Until the European Union reenforced labeling laws in 2007, many cheaper grades concealed the fraudulent addition of cotton, hazelnut, palm, sesame, and sunflower oils.

Currently, Spain grows more than 300 million olive trees, 70 percent of them in Jaén, Andalusia. That nation markets more than one-third of the world's 18.5 million tons (16.8 million metric tons) of olives. Since the late 1990s, in hope of developing more orchards to meet culinary demand, Indians, Japanese, Malaysians, Pakistani, and Sri Lankans have introduced their own varieties.

Wherever olives grow, from November to March, whole families carpet orchards with tarps and shake or beat trees to knock fruit to the ground. Dishes of olives are standard bar food in Spain and around the Mediterranean and a common ingredient in gourmet recipes for marinade, pasta, pizza, salad, salsa, and tapenade and dip. In Sicily, olive oil tastings and snack dishes of capo-nata retain the classic glory of the fruit. Engineers anticipate that the waste from olive presses will be a future source of electric power.

See also: Finger Food; Greek Diet and Cuisine, Ancient; Mediterranean Diet and Cuisine; Roman Diet and Cuisine, Ancient; Sicilian Diet and Cuisine.

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Organic Foods

As near as possible to its original form, organic produce comes to market in a pure state without additives and dyes, chemical fertilizer, genetic modification, irradiation, and toxins. British philosopher Christopher James Northbourne elevated organic agriculture in his book *Look to the Land* (1940), which championed environmental sustainability. The text claimed that society's ills have stemmed from the abandonment of traditional farming for capital intensive investment agriculture. His complaints included harm to the unborn and infants, whose undeveloped immune systems leave them vulnerable to the fungicides and insecticides linked to birth defects, cancer, miscarriage, and Parkinson's disease.

Since the 1940s, dietary purists have lauded Northbourne's concept of "life chemistry" by ridding edibles of the residue of industrial farming and processing that began in the twentieth century, namely arsenic and cadmium in chicken, dye on oranges, and Alar and wax on apples. Media advertisement of organic goods aided small farms in converting from inorganic monoculture to a profitable system devoid of agrochemicals. Agroforesters and smallholders shaped the human diet by marketing varied foodstuffs, notably, the pears, tomatoes, and

heritage greens and poultry that chefs applaud on their menus.

J.I. Rodale, Organic Crusader

Primarily through his own publications, American eccentric Jerome Irving Rodale (1898– 1971) became the prophet of purity to home gardeners. While living on an abandoned farm in Emmaus, Pennsylvania, during the Great Depression, he agitated against fertilizer and food additives, pesticides, refined flour and sugar, processed foods, fluoridated water, and tobacco. At his experimental farm, he grew orchards and vegetables that proved his theories about the value of natural goodness from the home garden.

As editor of Rodale Press and publisher of the magazines *Prevention* and *Organic Farming and Gardening*, Rodale harangued the home gardener to return to a pure source of nourishment from the earth, kept loamy and friable with mulch and earthworms. For loosening hardpan soil, he suggested ways of turning kitchen waste, grass clippings, and leaves into humus. He popularized the term *organic food* among disciples who grew their own fruits and vegetables in tidy kitchen gardens. For his quirky blend of science and opinion, *Newsweek* dubbed him the “Don Quixote of the compost heap.”

From Rodale’s one-man pulpit, streams of propaganda warned that the chemical pesticide dichlorodiphenyltrichloroethane (DDT) and industrial effluent threatened survival on Earth. His ideas on ecology inspired the Boy Scouts and 4-H groups committed to rescuing food from adulteration. He founded the nonprofit Soil and Health Institute, which battled cyclamates, phosphate detergent, and monosodium glutamate. As though preaching a nutritional gospel, his trademark text *How to Grow Vegetables & Fruits by the Organic Method* (1961) advised on seed selection, natural methods of propagation, and harvesting and storage of perishables.

Late Twentieth and Early Twenty-First Centuries

Among the benefits of organic farming and gardening with natural manures, healthier soil has maintained moisture and boosted harvests during the droughts

that have beset Ethiopia and Sudan. The heritage methods of tillage and local food distribution allegedly improve well-being for consumers and farm laborers while cutting soil erosion, cleanup of hazardous waste and polluted aquifers, and the energy costs of growing and harvesting corn, soybeans, and wheat.



Farmer and publisher J.I. Rodale of Emmaus, Pennsylvania, pioneered sustainable agriculture and popularized the term *organic* for foods grown without pesticides. He also founded such popular magazines as *Organic Gardening* and *Prevention*. (Co Rentmeester/Time Life Pictures/Getty Images)

In Cuba, residents have offset the loss of privatized urban farming by supporting *organoponicos*, small town gardens. Hunger and child mortality have declined owing to the availability of cabbage, chard, chives, cucumbers, eggplant, garlic, lettuce, mint, onions, and parsley from raised beds on hotel roofs and small plots allocated by the city of Havana. A resurgence of the Cuban “grandmother’s wisdom” from the older generation has revived ancient oral advice, such as the handling of plow oxen and the chopping of sugarcane waste into mulch and biofertilizer. To combat infestations in sweet potato fields, controllers began baiting banana stems with honey to lure the ants that kill borers. By the late 1990s, Cuba, a land too poor to adopt intensive agrarianism, was a leader in the marketing of organic citrus fruit and juices and in the growing of herbs for medicinal teas.

In January 2001, Dole Food Company, the world’s largest fruit and vegetable

seller, entered organic marketing by distributing bananas grown without bioengineering or chemical enhancements. The firm's advance into a limited specialties market coincided with issuance of the first national organic food standards by the United States Department of Agriculture (USDA), which regulates produce nationwide, beginning in August 2002. Researchers noted that although some consumers believed organic food tasted better and was more nutritional and safer, taste tests did not support their loyalty. Rather, blind tests confirmed that 10 percent of consumers willingly paid up to 14 percent more for edibles that they could not recognize as better tasting or higher in quality.

The USDA regulations for 100 percent organic foods forbade treating cropland or foodstuffs with antibiotics, chemical fertilizer, growth hormone, inorganic pesticide, irradiation, or sewage and outlawed genetic engineering. The "organic" label indicated at least 95 percent organic ingredients, and "made with organic ingredients," required 70 percent pure food. The regulations applied to fish, honey, mushrooms, and seafood. To reduce allergic reactions to eggs, milk, nuts, shellfish, soy, and wheat, food labelers dropped unfamiliar terms—*albumin* and *casein* — in favor of the clearer designations of *eggs* and *milk*. Stringent coding encouraged Earthbound Farms, the largest grower of organic salad greens, to introduce pure ingredients in baby food, which, in 2011, included kale.

A deterrent to traditional methods, the suppression of industrial techniques in the European Union and the Western Hemisphere bodes ill for risk management on artisanal farms. For the global food yield, holistic farming may not sustain future growth in the human population. In addition to more weeds, organic fields have higher levels of contamination from *Escherichia coli* (*E. coli*) and salmonella bacteria contained in manure, a source of sickness and death during such outbreaks as the vegetable-borne illness that struck 1,500 Germans and killed 16 in summer 2011. Rumors destroyed the public's confidence in Spanish cucumbers, lettuce, and tomatoes from organic farms until July 22, when researchers at the European Food Safety Authority traced the infection to fenugreek sprouts from Egypt.

See also: Aquaponics; Baby Food and Infant Feeding; Fungi; Honey; Raw Cuisine; Vegetarianism.

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P

Packaging

The packaging of goods for transport and sale enables food producers to secure perishables from delivery to market to domestic use. From 18,000 B.C.E., the earliest packing in animal organs, bamboo tubes, banana leaves, coconut shells, gourds, hollow logs, and parfleches (skin envelopes) involved found objects suited to wet and dry packing. Around the second century B.C.E., wrappings advanced to flexible containers—mulberry bark, linen sacks, resin-lined wineskins, and woven baskets. Unlike bronze vessels, wooden crates, and the earthenware amphorae of 6000 B.C.E., flexible casings weighed less and reduced transport costs but could not ensure the freshness and quality of edibles as well as sealing in bottles and crocks, mass-produced after 1500 B.C.E.

In this same period, Egyptian manufacturers industrialized glass urns, inert containers molded from melted limestone, sand, silica, and soda. Phoenician and Syrian crafters contributed pipe-blown glass around 500 B.C.E., producing the first round bottles. From 100 B.C.E., Egyptian and Phoenician coopering paralleled the growth of the mustard, olive oil, and salt fish industries. For vinegar and wine, convex oak barrels became both containers and aging media for imparting wood tannins to the liquid.

For dry commodities, Egyptians, Greeks, and Romans became the first to recycle used papyrus into food coverings. Asians followed in 105 C.E., when Cai Lun (Ts'ai Lun), an official of the Han dynasty, invented pulp paper to replace strips of bamboo and cloth. In 751, Arabs seized Chinese papermakers at Samarkand, in Uzbekistan, and set up paper factories in Baghdad, Bambyce, and Damascus. A Persian tourist, Nasiri Khosrau, in 1035 remarked on Cairo spice and vegetable dealers wrapping purchases in individual sheets made from recycled linen mummy wrappings. By 1665, the invention of rag-content blue paper provided a wrapping for cone sugar that doubled as a source of bluing and household dye.

Bags and Cans

After the late 1700s, European roll-stock paper reduced the cost of disposable grocery packaging. European merchants hand-glued bags for holding seeds, twisted sheets into cones and rectangles to carry candies and shrimps, and tied brown butcher paper or scraps of worn sails with rough twine to secure bulk bundles of bread and salt meat. Edam and Gouda cheeses received a wax outer coating, another form of packaging that house keepers reused, melting it into candles. For liquids, such as ale or milk from saloons and dairies, purchasers brought their own lidded tins carried by wire bails.

After French inventor Nicolas Appert perfected preservation in heat-sterilized bottles and jars in 1809, canning advanced rapidly in Europe and the United States. The technology suited the marketing of fine brandies and whiskies, condensed milk, maple and vanilla cake flavorings, and pickles as well as locally filled soda water from gold rush towns in California and Nevada. To ensure the purity of oysters, peas and carrots, sliced peaches, and tuna with a vacuum seal, tin-plated iron and steel cans required tedious soldering at the rate of 60 cans per day. For butter cookies and mints, bakers and confectioners in the 1830s designed pleated doily cups and lidded tins to protect contents from external impact during transport. The addition of painted scenes and seasonal greetings made the tins collectible and reusable as gift and pantry containers.

At dry goods stores, consumers carried their baking needs home in commercial paper bags after 1844, when cellulose sacking reduced the cost of cotton flour and rice bags. The addition of a gusset to sacks in the 1870s produced the stand-alone design, which left both hands free for filling with dried beans and raisins. Entrepreneurs designed unique glass containers, such as the jars that held Smith Brothers cough drops in 1866. After 1889, automation simplified the hand-blown shaping of glass to protect the aroma and taste of coffee beans, olives, sake, and seltzer water.

In Brooklyn, New York, in 1890, printer Robert Gair marketed the first folding paperboard carton, which the National Biscuit Company adopted as animal cracker and biscuit containers. Paper manufacturers perfected the pulping of cotton, flax, hemp, straw, wastepaper, and wood for low-cost disposable wrappings, which they printed with colored drawings and logos, for example, the

familiar Quaker on that brand of rolled oats. Factories began marketing wax-and-wire--capped reusable bottles to hold carbonated drinks and milk, paper cartons for cereals and grains, and corrugated fiberboard barriers and boxes that shielded such breakables as baby food jars, hot pepper sauce, and vinegar bottles from vibration and shock.

After standardization of food contents and purity under the Pure Food and Drug Act of 1906, U.S. consumers felt safer purchasing packaged goods. They bought juice and cooking oil in sterile bottles, onions and potatoes in mesh bags, and jugs sealed with Bakelite, a wood flour resin invented in Belgium by chemist Leo Baekeland, the “Father of Modern Plastics.” In 1910, cardboard boxes began replacing wooden crates for lightweight, but stable shipping of fruitcakes and shortbread. Within decades, grocers sold bananas and eggs from molded paper containers and loose peppers and tomatoes wrapped in cellophane, a regenerated cellulose barrier wrap refined in 1912 by Swiss chemical engineer Jacques E. Brandenberger.

Sealant breakthroughs distinguished processed foods, such as foil-wrapped chocolates and Tex-Mex burritos. Whitman’s Sampler, the first edible sold in cellophane, enjoyed a long shelf life free of bacteria, odors, and water. In 1913, Life Savers and Wrigley’s chewing gum came to market in aluminum foil sleeves. In 1914, cereal giant Will Keith Kellogg applied Waxtite to boxes of corn flakes baked in Battle Creek, Michigan. Milk was available from gable top waxed cartons in 1935.

Weight reduction dominated innovation. During World War II, the use of aluminum foil containers further reduced shipping weights of dinner rolls and frozen pies. In the late 1940s, Dole introduced an aseptic canning system that canned low-acid apricots and pears in laminated cans. The addition of Styrofoam cushioning in the 1950s ensured the safe shipping of grapefruit and oranges and protected sliced beef and pork in trays.

Pull-top cans of ready-to-eat meats and soups reached the market after inventor Mikola Kondakow made the first pull tab in Thunder Bay, Ontario, in 1956, three years before the engineering of the aluminum can. High-gloss advertisements drew shoppers to brand names. Royal Crown set R.C. Cola apart from competitors in 1964 with the first ring-pull can. Airlines and fast-food restaurants offered disposable packet portions of jelly, ketchup, and mayonnaise.

Industrialized Packaging

In the 1950s, aseptic, temperature-controlled filling of hermetic containers, shrink wrapping, and conveyor belts limited the number of contacts between edibles and human hands. Aluminum, molded pulp, and plastic blister packaging in the 1960s reduced the weight of canned goods for self-service shopping. Attractive hygienic wrappings promoted shelf appeal in grocery items, such as the individual yogurt servings in polystyrene cups. Activated charcoal and silica gel desiccants protected snack chips from moisture; plastic shopping bags suited mass consumption and reuse. In 1969, fruit growers began waxing Washington State Delicious apples, a transparent surfacing that eventually passed to packagers of green peppers, smooth melons, eggplant, citrus fruit, cucumbers, and squash as a shield of freshness and moisture, protection from bruising, and enhancement of appearance and salability.

The moon landing on July 20, 1969, testified to the convenience and durability of packaged deep-frozen pizza and read-made meals for lengthy transport. Open-resistant lids and seals kept children safe from choking hazards, such as cashew nuts and hot dogs; tamer proof security seals such as shrink neckbands guaranteed portion size and purity in feta cheese and soy sauce. After 1973, Nesquik came to the shelf in a rectangular composite can printed on all four sides with ingredients and recipes. The packaging of cola drinks and hot-fill jams in transparent polyethylene terephthalate (PET) further reduced the weight of rigid, impact-safe containers.

By the mid-1970s, the green movement resulted in minimal wrapping, such as the postharvest bagging of limes and yams. Individualized labeling included suggestions for disposal or reuse. City planners provided boxes, color-coded bags, and wheeled bins to facilitate curbside collection. Civic centers recycled aluminum and steel cans, cardboard, glass, paper, and polystyrene to turn scrap into usable raw materials. In 1986, Coca-Cola announced the first refillable PET drink bottles, a boon to urban landfills choked with fast-food litter.

Because of the information revolution of the 1980s, labeling featured low-calorie, no-cholesterol, and salt-free formulations to lure health-minded consumers. By 1981, U.S. supermarkets installed 10,000 scanning devices. Scanner tills rapidly computed costs while documenting buyer age, gender, and

preferences for pantry staples and luxury items. In the 1990s, unitized cases transported by robot reduced the cost and damage of handling in global favorites, such as mineral water from Perrier, France. On February 4, 2002, Cargil-Dow of Minneapolis introduced bioplastic deli trays from biodegradable corn and sugarcane rather than petroleum.

As the Internet and liberalization of national trade barriers enhanced global food sales, companies reversed earlier standards to supply labels lettered to suit the needs of consumers with impaired sight and boxing that disabled fingers can open. Border inspections protected buyers from adulterated goods. The trackable labeling and barcoding of “intelligent packaging” provided date and place of origination, a valuable tool for the Centers for Disease Control in tracing sources of *Escherichia coli* (*E. coli*) and salmonella found on frozen foods, meats, produce, and processed seafood.

A more anticipatory technology, “active packaging” contains ethanol emitters to flag stale baked goods and fish, a control promoted by Australian and Japanese consumers. Double-walled temperature-control wraps guard the freshness of beverages, meats, and ready-to-eat meals. Carbon dioxide and oxygen scavengers check changes in coffee, nuts, and snacks and indicate spoilage with darkening in colored tape. Preservative releasers emit antioxidants to extend the shelf life of bread, cereal, cheese, snacks, and vegetables. Additional safeguards derive from moisture absorbers in sandwiches and odor absorbers in dairy products and fruit juices.

See also: Bamboo; Canning; Caravans; Clipper Ships; Freeze-Drying; Soft Drinks and Juices.

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Paleolithic Diet

A nutritional plan of preagricultural foragers of 200,000 B.C.E., the Paleolithic diet centered on the fiber and nutrients of fruits and berries, mushrooms, root crops, green leafy vegetables, tree nuts, seeds, eggs, insects, herbs and spices, raw honey, seaweed, and seafood. The low-fat meat of game mammals—bear, caribou, elk, ibex, moose, reindeer—and of fowl—ducks, geese, ptarmigan, seagulls, waterbirds—produced some two-thirds of daily consumption, which contributed to the development and support of a large brain. To make skinning and slicing easier, central Africans produced serrated or notched knives for cutting pieces into mouth-size chunks for eating raw. The highly carnivorous Eskimo collected berries, mushrooms, tubers, and willow leaves as condiments to relieve the tedium of meals of beluga and bowhead whales, seals, and walruses. The Ohalo II dwellers in Israel's Rift Valley supplemented meat with grass seed; the Netiv Hagdud on the West Bank added wild barley, beans, and nuts to the Paleo diet. Similar alterations to heavy protein consumption at Jerf el-Ahmer and Mureybet, Syria, included wild barley and rye.

About 10,500 B.C.E. at Nevali Cori, Turkey, inhabitants began the revolutionary transition to domesticated einkorn, a hulled wheat. The innovations of Neolithic, or New Stone Age, humankind around 8000 B.C.E. shifted emphasis from meat to cooked beans, manioc, peanuts, potatoes, and grains—barley, corn, millet, oats, rice, sorghum, and wheat, the bases of bread, flour, noodles, and pasta. Easily stored and transported, these high-calorie foods reduced the fiber of the preagrarian diet while scaling back body height and bulk and boosting energy. In this same period, residents of central Texas lined earth ovens with rock to bake camas bulbs. In the Chihuahua Desert on the Tex-Mex border, around 7500 B.C.E., Paleo-Indians appear to have pit-baked agave, sotol, and wild onion, the triad of their diet. Contributing to post-Paleolithic ills, communities settled on farmland, became more sedentary, and consumed quantities of domesticated meat, grain, cheese, and milk. Their highly organized communities easily bested hunter-gatherers, who flourished in the arctic, deserts, and remote jungles.



Hunter-gatherers from the Upper Paleolithic (Late Stone Age, 40,000 to 10,000 years ago) in France carved these bone tools for hunting and fishing. The end of that era marked the transition to domestic agriculture. (Dea/A. Dagli Orti/De Agostini/Getty Images)

Coprolitic study gives a clear view of prehistoric diet in southwestern Texas around 7000 B.C.E. Sampled at Comstock in Val Verde County, Paleo-Indian feces attest to a diet that was 75 percent carbohydrate. In addition to fat and protein from birds, caterpillars, clams, deer, eggs, grasshoppers, lizards, mice, rabbits, and rats, Paleo-Indians chose fibrous local flora. Enriching the foragers with substantial plant nutrition were acorns, agave, berries, biscuit root, cacti, grapes, mesquite, pecans, persimmons, sunflower seeds, and walnuts. Anthropological details describe cookery as clay pot cuisine eaten from gourd bowls with wooden spoons. Forensic study of skeletal remains proves that the varied diet left diners healthy, trim, and almost parasite free.

In 1975, Seattle gastroenterologist Walter Lyle Voegtlin, author of *The Stone Age Diet* (1975), promoted caveman fare as the ideal sustenance for human health and vigor. In 1982, Loren Cordain, a professor of health and exercise science at

Colorado State University, popularized the Paleo diet. Influenced by physician Stanley Boyd Eaton and Melvin J. Konner, an anthropologist and neurologist at Emory University, the authors of the treatise *Paleolithic Nutrition* (1985), Cordain increased the endurance of athletes with a prehistoric diet. Stripping the daily intake of alcoholic and caffeinated beverages, dairy foods, carbohydrates, sodium, processed oil, salt, food additives and preservatives, manufactured vitamins, and refined sugar, he proposed an evolutionary diet to rid humans of chronic afflictions—acne, alcoholism, allergies, arthritis, asthma, autoimmune disease, cancer, depression, diabetes, emphysema, gout, heart disease, high blood pressure, kidney stones, migraines, obesity, osteoporosis, schizophrenia, stroke, and tooth decay. A trendy Stone Age or “Garden of Eden” diet of meat, fish, and raw or cooked fruits and vegetables gained respect for its promotion of wellness, athletic performance, mental acuity, and longevity.

Critiques of the primal or ancestral diet vary, from evidence in cave paintings and forensic research to extremes of speculation. From studies of New Guineans on the island of Kitava, nutritionists have pondered the value of bone marrow, brain tissue, and organ meats along with tubers and root crops—beets, carrots, celeriac, parsnips, rutabagas, salsify, sweet potatoes, turnips, and yams—to a health regimen that naturally suppresses hypoglycemia and diabetes. Experts value almonds and walnuts for adding copper, iodine, iron, selenium, and zinc to brain development and function. Other specialists refute hasty claims of long and healthy lives from restricted diet, because Paleolithic nomads did not live long enough to develop the so-called “diseases of affluence.” The reversion to spring water lacking chlorine and fluoride raised questions of sanitation and threats to bone and tooth resilience as well as the waste generated by plastic water bottles. Economists note that a global adherence to the caveman diet would endanger populations that depend on grain-rich fare and grass-fed herds. The inclusion of such exotic foodstuffs as coconut water likewise would place a hardship on countries north of the tropics.

See also: Agribusiness; Hunter-Gatherers; Pemmican; Voegtlin, Walter L.

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[Pan-European Diet and Cuisine](#)

The Continental cuisine of Europe, called Western cuisine, distinguishes itself from Asian menus in the high proportion of dairy and meat items to carbohydrates, fruits, and vegetables. During the Middle Ages, cereals in the form of frumenty or fermenty (cracked wheat boiled in milk), gruel, and porridge dominated meals for the millennium, with beans, peas, and turnips playing a lesser role in period open-hearth cookery. Those who could afford meat favored cod, herring, pork, and poultry over beef, the most expensive. Middle Eastern intellectual exchange during the Crusades encouraged spicing as an alternative to ancient forms of food preservation by air-drying, brining, brewing, fermenting, pickling, salting, and smoking.

In the 1300s, barley, oat, rye, and wheat breads formed a literal basis for dishes as trenchers on which servers ladled stews. Cooks varied predictable tastes and textures with sweet-and-sour alternatives produced by blending honey and sugar with verjuice from unripe grapes or crab apples and vinegar. Thickening with bread crumbs and ground chestnuts gave place to a more delicate texturizing with almond flour, milk, and paste. Apprentices studied methods firsthand and memorized portions. Church control enforced fast days as a means of controlling gluttony, one of the seven deadly sins. Sumptuary laws restricted the lower

classes from emulating the table excesses of nobles and Benedictine monks, the best fed of Europe's monastics.

The Renaissance produced experimentation in pastries and pies and kitchen notation, the forerunner of the modern recipe. Professional food service at cookshops and roadside inns fed travelers on fritters, pasties (meat pies), rotisserie mutton and pork, soups, and turnovers. Pubs offered ale, cider, perry, and wine and a cold snack later dubbed the "plowman's lunch," a serving of boiled egg, bread, cheese, onion, pickle spear, and sausage. In contrast, aristocrats expected meat service of geese, peafowl, rabbit, quail, songbirds, and swans. Carvers made a display of slicing and plating bites from whole stuffed carp and lampreys. Sommeliers served appropriate wines, an introit to Europe's famed table vintages.

The Columbian Exchange increased pantry choices to include coffee, tea, and hot chocolate, flavored with sugar and vanilla. Bland recipes took on a New World sparkle from the addition of chili peppers, cocoa, corn, kidney and lima beans, potatoes, sweet potatoes, and tomatoes. Prosperity from the import-export food trade encouraged mealtime escapes from Mediterranean pasta and German and Slavic dumplings with the latest in potato and rice dishes. As cash flow allowed, consumption of imported brandies, meat, and olive oil increased in Great Britain, as did the social consumption of tea with biscuits and marmalade, an upgrade of the classic Roman *defrutum*.

The formation of food guilds promoted cooking specialties in confections, distilled beverages, pastry, meats, and saucing as well as cookbooks designed for the professional caterer. The kitchen wizardry of Florentine chefs imported to France in 1533 by Catherine de' Médici for her marriage to Henry II kindled a burst of innovation with aspic, broths, choux pastry, fruit ices, gratins, and vegetable arrays of artichokes and cardoons. Master cook Bartolomeo Scappi, the chef to popes Pius IV and Pius V, captured the flair of Italian cuisine in *Opera dell'Arte del Cucinare (Culinary Works of Art, 1570)*, a compilation of 1,000 recipes for caviar, foie gras (goose liver), kidney fat pastries, Parmesan cheese, precise cuts of calf's head and ox tongue, and soused (brined) perch, rays, and sturgeon. Translations of Scappi's cookbook inspired alternatives to the salt-fish cuisines of Holland and Iberia.

Additional cooking guides—Marx Rumpolt's 2,000 recipes in *Ein New*

Kochbuch (*The New Cookbook*, ca. 1581) and gentleman farmer Hugh Platt's *Delightes for Ladies* (1600)—outlined emerging national cuisines. Rumpolt spoke from experience of the balancing of entrées at banquets; Platt described hands-on kitchen experiments in candying and preserves and championed imported French wines for quality. Refined dining reached a height with the issuance of chef François Pierre La Varenne's *Cuisinier François* (1651), a tribute to *haut goût* (full flavor), and food writer François Massialot's *Le Cuisinier Royal et Bourgeois* (*The Royal and Middle-Class Cook*, 1693), which simplified the roasting of turkeys, a fad food imported from North America.

The shift toward simple preparation of fresh produce in the modern era produced a general term—*Mediterranean diet*—to describe the pervasive southern European consumption of seafood, whole grains, legumes, and salads dressed with lemon juice and olive oil. Middle Eastern elements—falafel, garlic, grilled fish and mutton, hummus, and pita bread—complement the Portuguese addition of *feijoada* (beef or pork stew) and Majorcan paella, a rice-based mélange of fresh vegetables, clams and mussels, and ham. Ethnic heritage dishes—Albanian cucumber and yogurt soup, Macedonian skillet beans, Maltese stuffed artichokes, and Sicilian manicotti—maintain the health benefits of regional dishes.

Central European contributions to Continental menus feature indigenous eggs, meat, and vegetables in Armenian string cheese, Serbian lamb soup, and the Slovenian *fritaja* (omelette), made with garlic sprouts and wild asparagus. Russian *solyanka* (cabbage and pickle soup), Georgian *lobio* (spiced beans), Slovak potato dumplings, and Bulgarian spicy salami epitomize the earthy fragrance and richness of the regional diet. Heavier meals to the north—Czech fried potato cakes, German sauerbraten, Polish kielbasa, and Slavic pierogi (boiled dumplings)—break the Mediterranean pattern of light meat servings with heartier blends of meat with carbohydrates.

Northern Europe maintains a distinct presence in Continental fare, from Estonian black bread and rhubarb pie to Sami fried reindeer with mountain sorrel stew. The British Isles produce flavorful combination dishes, including English fish and chips, Irish Celtic steak with egg mayonnaise, Scots finnan haddie (smoked haddock) poached in milk, and Welsh faggots (meatballs) and leek soup. Like Russian and German menus, Scandinavian cookery favors strength of aroma and taste, the memorable elements of Danish red sausage, Finnish lingonberry

jam, Norwegian gravlax (cured salmon), and the Swedish smorgasbord and vodka cocktails.

See also: Medieval Diet and Cuisine; Mediterranean Diet and Cuisine; Pastry; Wine.

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Pasta

A popular form of grain worldwide, pasta offers 350 shapes and a variety of applications for cheese, meat, sauced, and sweetened dishes. A national staple in Italy, dried and fresh pipes, strands, and swirls made from hard durum semolina, eggs or egg yolks, salt, and water contribute protein to the diet. A classic food description from the Greek *pasta* (barley porridge), shaped pasta appears to have begun in Etruscan Italy after 750 B.C.E. as a wide noodle that cooks flattened with a rolling pin and sliced with a cutter. The term *lagana* appears in *Sermones* (*Satires*, ca. 30 B.C.E.) of the Roman poet Horace, who referred to a common supper of sheets of fried dough similar to the lasagna noodle, a pasta featured in simple baked dishes.

Additional mention a century later by the Greek healer Galen and by rabbis in the Jerusalem Talmud (ca. 350 C.E.) precedes a more detailed description of Arab travel food in the 400s and by Libyan soldiers in the 690s during the forced conversion of North Africa to Islam. Recipes from the eighth century featured the

Arab preparation of macaroni in saffron-dyed chicken soup and listed the addition of cinnamon and raisins to noodles mass-produced in Palermo, Sicily. In the early 900s Jewish doctor Isho bar Ali, a Syriac lexicographer working in a Baghdad convent, characterized the extruding of semolina *atriya* (strings) for drying. After 1090, Arab cookbooks listed 80 recipes for triangular *sambusa* (ravioli or meat pockets).

In 1154, Arab travel writer Muhammad al-Idrisi described the pasta industry that flourished in Trabia, Sicily, and Sardinia, a producer of free-threshing durum wheat. Exporters in Genoa and Pisa bore shipments to Calabria and over Europe and the Middle East, where suppliers bought pasta to supply camel caravans and ship crews. Upon the return of Venetian merchant Marco Polo from China in 1295, he brought a similar product, rice wonton wraps for dumplings, which reminded him of the pasta of home. Culinary historians surmise that Italians invented the table fork around 1300 as a means of handling hot, slippery servings.

Pasta Culture

The anonymous *Libro de Coquino* (*Book of the Cook*, ca. 1300) described the filling of ravioli with small meatballs and the sealing of edges for frying in oil and serving with honey, a vast difference from saucing after the discovery of the tomato in the sixteenth century. At Leonessa on Fat Thursday preceding Good Friday, *pencarelli* (long, thin spaghetti) marked the arrival of Lent; in Vulture, in south-central Italy, cooks honored Ascension Day, the fortieth day after Easter, with *tagliolini* (noodles) simmered in chicken broth. At Orvieto, north of Rome, Christmas Eve macaroni came to the table with honey and walnuts. The Abruzzi welcomed December 26 with *volarelle* (squares with scalloped edges) in broth with cardoons; at Romagna, outside Bologna, Christmas demanded the filling of *cappelletti* (little hats) with ricotta cheese. Other communities celebrated the Yuletide and Easter with *tagliatelle* (ribbons).

On the cusp of the Italian Renaissance, mechanization in Naples in the 1300s simplified the varied pasta extrusions of semolina stomped by laborers' feet. Throughout Campania, the Sarno River powered small wooden mills that passed dough through interchangeable bronze or nickel dies, a time-saver over

homemade technology using knitting needles, reeds, and umbrella spokes. At urban spaghetterias, shapes such as *gemelli* (twins), *radiatore* (wheels), and *stelline* (little stars) held the flavor of sauced dishes and the dressings in pasta salads. Meanwhile, peasant women continued to shape by hand the more complicated *farfalline* (little butterflies) and *orecchiette* (little ears). By lowering costs, dealers targeted the average consumer, who turned pasta into the national dish of Italy.

Other shapes received professional discussion, especially ravioli. In *Libro de Arte Coquinaria* (*Book of the Cook's Art*, 1465), Maestro Martino de Rossi, a chef under Pope Paul II, summarized how to curl Sicilian *pasta pertusata* (macaroni) on iron rods and make Roman fettuccine by folding dough over a stick for cutting into ribbons. Martino boiled the fresh lengths for two hours. His enthusiasm for pasta created an urban demand for the dried commercial food. Around 1490, Neapolitans satisfied their customers by importing Sicilian pasta to serve with butter and cheese.

Haute Cuisine

Stuffed pasta epitomized the sophisticated recipes of high Renaissance cuisine. On December 12, 1549, master chef Scappi served the small meat pies in broth at a conclave for Vatican cardinals following the death of Pope Paul III. Scappi's original pasta recipes called for lasagna noodles for wrapping capons, ducks, and geese and for serving light pasta in broth as invalid meals.

By the seventeenth century, Parmesan cheese-topped pasta became a standard side dish for the Neapolitan elite but a whole meal for the lucky Italian peasant who could afford it. Florentine author Giovanni Del Turco's *Epulario e Segreti Vari* (*The Italian Banquet and Various Secrets*, 1602-1636) cut the boiling time for pasta to minutes to produce an *al dente* (firm) consistency and lessen work for the home cook. Throughout Liguria, mills at Imperia, San Remo, and Savona hurried to keep pace with demand for pasta. By the 1700s, Naples led the world in open-air pasta factories.

In 1790, Roman chef Francesco Leonardi's *L'Apicio Moderno* (*The Modern Apicius*) featured the fusion of European pasta with cheese and New World

tomato sauce, a dramatic moment in culinary history. By the early 1800s, baked lasagna earned favor with nobility at the court of Naples. In 1855, Sardinian die makers patented more sophisticated pasta machines from engineering derived from the Industrial Revolution. In 1860, liberator Giuseppe Garibaldi predicted that the popular dish would unify Italy into a modern nation. By 1891, a Palermo catalog, *Esposizione Nazionale Illustrata di Palermo 1891–1892 (The National Illustrated Exposition of Palermo)*, offered more than 100 pasta shapes. In 1934 at Uzwil, Swiss brothers Hanspeter and René Bühler invented the piston-driven metal worm for continuous macaroni extrusion.

Currently, Italians select a pasta dish for the first course of the meal, whether *pastina* (tiny shapes) in broth or *pasta ripiena* (stuffed pasta) baked in sauce. Natives consume 60 pounds (27 kilograms) of pasta annually, an amount three times that of Americans. Versions gained popularity worldwide—in China served with sausage, in India spiced with cumin and turmeric, and in the Philippines topped with banana ketchup and hot dog slices. Sicilians prefer a winter dish that tops linguine with tuna and cracker crumbs. In Mexico, cooks add spaghetti to soup; farther south, in Argentina and Brazil, immigrants from Italy preserve original recipes for gnocchi (potato dumplings) and ravioli.

See also: Israeli Diet and Cuisine; Italian Diet and Cuisine; Mediterranean Diet and Cuisine; Sicilian Diet and Cuisine; Yeast.

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Pastry

Tender baked goods made from soft, low-gluten dough, pastry employs grains and emollients to produce a crumbly or flaky texture. The Egyptians, Greeks, Phoenicians, and Romans developed phyllo dough for multilayered confections filled with cream, fruit, honey, and nuts. Egyptian bakers from 3000 B.C.E. filled their cakes with almonds, dates, honey, pine nuts and walnuts, and poppy and sesame seeds. After 1186 B.C.E. under Ramses III, the devout annually sacrificed 9,000 cakes to souls in the afterlife.

In the first century C.E., Chrysippus of Tyana, Cappadocia, compiled Greek pastry recipes in *Treatise on Baking*, a cookbook now lost. According to Apicius, a respected gourmand from the same era, Roman cooks deep-fried fruit fritters, the forerunner of beignets (fried dough). Specialists made *crustuli* (cookies) from nut flour, stacked wedding cakes, and shaped pastries into crescents in honor of Luna, the moon goddess. Chinese bakers made traditional moon cakes and *zong* by filling sticky rice with jujubes or sweet bean paste and wrapping the dumpling in bamboo leaves for steaming.

Parallel with advances in oven building after 1000, medieval pastry makers improved on classic recipes. They replaced oil with butter and lard and glazed custard and fruit surfaces with egg yolk. Middle Eastern pastry flourished in the late eleventh century, when it impressed crusaders with its crunch and layered sweetness. An Eastern European favorite, the Polish *paczki* (jelly doughnut) marked the Thursday before Easter as a special day, when cooks used up pantry stock to prevent the family from violating the strictures of Lent. For Epiphany, the Dutch created the *oliebol*, a deep-fried dumpling and forerunner of doughnuts. In the 1200s, Austrian pastry specialists made *kipferls*, crescents filled with fruit or nuts.

In 1303, the word *pie* appeared in literature as a popular recipe for fruit blends and mincemeat. The Chinese commented in 1330 on *gullach*, a Ramadan specialty similar in its layering to baklava. The light, flaky dessert featuring honey and nuts, reputedly received refinement under Turkish cooks at the Topkapi Palace in Istanbul after 1465.

In 1404, brioche (sweet egg bread) first appeared on record as a spiced bun or cake of Norman origin served at communion as “blessed bread.” Italians made the

first nougat at Cremona early in the 1400s, contemporaneous with the creation of Venetian marzipan and almond and honey *turrôn* (nougat bars) in Sexona, Spain. In the early 1500s, Portuguese voyagers returned from China with a star-shaped technology for extruding dough into churros, a Hispanic breakfast treat served with *café con leche* (milky coffee) or hot chocolate.

Throughout the Christian realm, bakers and confectioners connected sweet treats with salvation. At Advent, Christmas, Epiphany, and Easter, they filled their showcases with gilded and sugared cookies shaped like fish and tarts and marked with religious acronyms and symbols. The Catholic Church dispatched pastry makers from French convents to the colonies to raise funds by selling chocolate cookies, *feuillantines* (flaky blocks), fritters, and *oublies* (waffles).

Baked Delicacies

When Catherine de' Médici moved from Florence to France in 1533 to marry Henry II, she brought pastry artists who designed the almond and *chantilly* (whipped cream) stuffed *frangipane* and the *macaron*, a cookie sandwich made from almond flour and filled with buttercream. Chef Nicolò della Pigna refined *pastillage*, the creation of architectural pastry centerpieces from sugar flowers and gum paste figures. Panterelli, the new queen's head chef, created the first egg-based choux pastry in 1540. The recipe set a standard for light, flaky desserts and treats, a contrast to the dense blends of chocolate, kirsch (cherry brandy), sour cherries, and whipped cream in the late sixteenth century for Black Forest cake, named for Schwarzwald, Germany.

With imported chocolate and cane sugar, seventeenth-century European bakers created unique traditions for service with coffee and tea, notably, the Austrian linzer torte, the world's oldest extant recipe. Innovations included French baker Cyprien Ragueneau's almond tartlets and marzipan cakes in 1638, cookbook author François Pierre La Varenne's *mille-feuille* (thousand leaf) of 1651, and croissants (buttery yeast rolls), created in 1686 in Budapest to replicate the crescent on the Ottoman banner. In 1653, the founding of the Lebküchler guild in Nuremberg recognized professional German pastry makers. American colonists made pastry of unique ingredients—blueberries for cobbler, corn and

molasses for popcorn balls, pecans for pie and pralines, persimmons for pudding, and pumpkin and sweet potatoes for pies.

In the eighteenth-century, cooks created the Austrian apple strudel, the cinnamon and egg tart made in Portuguese convents, and the delicate French petit four for crisping in coal ovens. In 1740, the Polish king Stanislas Leszczyński brought to France *baba au rhum*, a Slavic cake soaked in alcohol; chef Jean Avice, Talleyrand's Parisian caterer, added his own touch in 1760 with toasted choux, which he filled with cream. Marie Antoinette broadened the French flair for treats in 1770 by introducing the Hungarian croissant and Viennese pastry.

In 1815, the published techniques of master pastry chef Marie-Antoine Carême, called the "Palladio of Pâtisserie," promoted *babas*, marzipan, meringues, *pastilles* (lozenges), profiteroles (cream puffs), spun sugar, and tarts as a culinary art. He earned fame for his almond *croquants* (crisps) and the *crustade des peches* (peach pie) he designed for the coronation of the Emperor Napoleon. Carême's primary work, the *pièce montée* (mounted display), consisted of an architectural fountain, pyramid, ruin, ship, or temple of choux pastries glued with gum arabic and mastic. He topped the edible extraordinaire with caramel, chocolate, and sugared almonds and enlaced it with sugary ribbons and threads. During the same era, German chocolatiers refined the Sacher torte and pastries painted with cocoa powder.

Business

During the Industrial Revolution, pastry graduated from art to entrepreneurial skill. After publisher August Zang opened a bakery in 1838 in Vienna, he initiated use of the steam oven, which preserved the taste of baked pastry. The Viennese dominated puff pastry, a buttery, paper-thin basis that Italians called *pasta sfogliata* (folded pasta). The *crème pâtissière* (custard) filling emphasized the flavors of cream and eggs with confectioner's sugar, lemon, and vanilla. Austrians assembled the rich delights of the Continental breakfast—*chausson aux pommes* (apple turnover) and *pain au chocolat* (chocolate bread) and *pain aux raisins* (raisin bread).

Danish pastry got its start in 1850, when a strike of bakers and confectioners

required the hiring of the part-time labor of French outsiders. American restaurants adopted French specialties in 1851 with the introduction of the cream puff. The éclair appeared on menus in the 1860s and in *The Royal Book of Pastry and Confectionary* (1873), by Paris food writer Jules Gauffé.

Late-nineteenth-century industrialization brought mechanized mixing and kneading to commercial baking. Speed enabled bakeshops to relieve the house holder of daily chores. Emulsifiers and stabilizers lengthened shelf life of goods untouched by human hands until the 1970s, when artisanal bakeries revived waning appetites for cheese straws, crullers, and fruit turnovers. Supermarkets added artisanal pastry shops for made-to-order birthday cakes and holiday tarts.

See also: Carême, Marie-Antoine; French Diet and Cuisine; Haute Cuisine; Ice Cream; Yeast.

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[Paula Marín, Francisco de \(1774-1837\)](#)

Spanish horticulturist Francisco de Paula Marín broadened the range of fruits and vegetables grown for sale in the Hawaiian Islands.

A native of Jerez de la Frontera northeast of Cádiz, Andalucía, Marín went to sea at age 15 with the Alessandro Malaspina expedition from Vancouver, British

Columbia, to Nootka, Alaska. In December 1794, he deserted the Spanish navy and sailed to Hawaii on an American vessel, the *Lady Washington*. At age 20, he joined the staff of King Kamehameha I as accountant, diplomat, translator, and ordnance expert.

In 1811, with acreage at Honolulu, Marín—known as Manini or Marini—built a home for his growing family of five wives and 23 children. In addition to teaching local builders to make adobe, he tested soil and planted experimental gardens of asparagus, bananas, barley, beans, cabbage, carrots, celery, corn, garlic, greens, horse radish, lettuce, melons, onions, rice, tomatoes, turnips, and wheat. From Peru, he imported healing herbs to treat dysentery and influenza and to combat the unidentified fevers that generated a child mortality rate of 50 percent. He operated a livery stable and served the king as royal physician. At Marín's boardinghouse and tavern, foreign merchant captains and whalers gathered. From their gifts of seeds and roots from California, Central and South America, and the West Indies, he became Hawaii's first commercial farmer and the first to recycle food by products into such commodities as beer, candles, and soap.

Navigators and privateers brought Marín cattle, goats, horses, poultry, and sheep, which he raised on Ford Island in Pearl Harbor. In 1813, he planted the region's first lemons, oranges, and pineapples and two more firsts, cotton and the Tahitian mango. His first coffee plantation failed in 1817, but he harvested the first oranges two years later. An 80-foot (24-meter) mango tree became a Honolulu landmark. He introduced grapes from mission vineyards in Santa Barbara, California, and made the first peach brandy and wine. Marín also made beer and grew sugarcane for rum, and by the 1820s, his distilleries manufactured beverages for sale. During his service to Kamehameha II, food taboos ended for women, allowing them to eat the same menu as males. For Marín's contributions to the islands, he earned a captaincy in the Hawaiian army.

In 1825, Marín hired English agriculture instructor John Wilkinson and added to his fields arabica coffee plants procured from Brazil by Scots botanist James Macrae. Marín imported from England apple, cherry, custard apple, peach, plum, and nectarine trees. His suppliers donated Guatemalan cocoa, Mexican avocado and chilies, Tahitian breadfruit, and citrus, guava, myrtle, and sassafras plants from Rio de Janeiro. He shipped mangoes and pineapples to California and

stocked ships' larders with his products—butter, castor oil, cigars, coconut oil, hay, *kukui* skin oil, lemon syrup, lime, molasses, pickles, plant stock, poi, pond fish, rose bushes, salt, soap, and sugar.

In Marín's late fifties, Hiram Bingham, a puritanical missionary from Vermont, agitated for restrictions on the sale of Marín's alcoholic beverages and for the banning of grog shops. Marín's introduction of cotton succeeded in 1835 with the completion of a cloth mill at Kailua. In 1837, he planted the islands' first macadamia tree. German botanists and Russian horticulturists visiting his gardens and parcel in the Pauoa Valley in northeastern Oahu admired the adaptation of food plants from many sources, including the avocado, olive, papaya, prickly pear, and tamarind. Altogether, Marín introduced 65 edible species to Hawaii.

See also: Beer; Maritime Trade Routes.

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[Pemmican](#)

A trade item of the Canadian Assiniboin and Métis peoples, pemmican earned the name “bread of the wilderness” for its value to expeditioners. In the Canadian Northwest, the preserved food derived its name from the Cree *pimikian*. It provided a lightweight, nutritious, and easily transported snack and trail food for the region's *coureurs de bois* (woods runners), traders, and explorers.

For thousands of years, Plains Indians extended the use of buffalo meat by preserving it in pemmican and storing it in sacks as survival rations. Eskimos

survived for centuries on the all-meat diet, which they based on the flesh of musk ox, seal, and bear. Spanish conquistador Francisco de Coronado made the first historic reference to pemmican in 1541 during his New Mexican expedition, which encountered the forerunner of Southwestern chili on the route between New Mexico and the Texas Panhandle.

To the north, the Assiniboin of Pembina, North Dakota, developed the pemmican industry to its height. After the arrival of the French in 1640, Catholic priests who converted the Dakota Indians substituted pemmican for scarce communion bread. Native buffalo hunters taught Euro-Canadians the right time to stalk herds, the difference in meat from bull and cow, and the selection of the choice meat from hump and rump for preservation. By trading condensed meat rations for clay pipes, glass beads, horses, tobacco, and tools, natives enabled fur traders and mountaineers to survive in the Canadian West and Arctic regions.

Pemmican production united matriarchal societies into effective manufacturers. Made by women, pemmican required labor-intensive boning and slicing of buffalo, deer, elk, moose, or wild sheep meat into strips for fire or sun drying over willow. For a 90-pound (41-kilogram) bag of pemmican, preparers required two buffalo cows. They pulverized the dried meat into powder with a wooden mallet or shredded it into flakes with a flail or between stone pestle and mortar. The women seasoned the condensed jerky with hot buffalo tallow from the hump or rump or with marrow fat, which men extracted by cracking the bones and boiling them in water. A high-grade mix, called fine pemmican, involved using fat only from the buffalo udder. For seed pemmican, women flavored the mix with ground blueberries, buffalo berries, chokecherries, cranberries, prairie pear, or saskatoons as well as wild onions. The Blackfoot of Saskatchewan preferred to flavor meat with mint leaves, a powerful digestive aid. The Sioux produced a meatless version made from parched corn.

In western Alaska, Eskimo preparers of *agutak* whipped fat from caribou, seal, or walrus into a froth for blending with salmon or caribou meat, moose or reindeer tallow, roots, sugar, and fruit, such as blueberries, cranberries, crowberries, or salmonberries. Farther west at Kamchatka, Russia, the Chukchi, nomadic hunter-gatherers, followed a similar recipe, combining dried or flaked fish, roe, reindeer or seal fat, and bilberries.

Meat Preservation

Preservation simplified storage and haulage by reducing watery content. For cooling, hardening, and distribution, pemmican makers stitched the finished product into buffalo parfleches (hide bags) with a sinew and walked over each to squeeze out air pockets. Users tied pemmican by thongs onto pack animals or stored slabs in a ground cache or under a riverbank as an insurance of emergency food during winter or under siege. Plains Indians distributed pemmican as gifts to relatives; young Hidatsa males gave slabs of pemmican to likely mates as engagement presents. Arctic aborigines fed the trail mix to their sled dogs. Tundra trekkers ate the high-energy product raw while on the move, floured and fried it in oil like steak, cooked it with flour into *hoosh* or *rubbaboo* (stew), or broiled it with wild parsnips over campfires. They also could layer pemmican in caches on rock beds to preserve it for as long as 30 years.



Sioux women made pemmican by pounding venison, berries, seeds, and fat in a mortar and shaping the mixture into small patties. Native peoples preferred local sources of fat and protein to flavor such high-energy, easy-to-transport survival foods. (*Marilyn Angel Wynn/ Getty Images*)

The Algonquin recipe for pemmican consisted of half protein, for sustaining muscles and organs, and half fat, for energy. The Lewis and Clark expedition received stores of pemmican from the Mandan and recorded their first taste of

pemmican cakes on September 26, 1804, when the Teton Sioux served it with dog meat and ground camas tubers near Fort Pierre, South Dakota. Robert Michael Ballantyne, a Hudson's Bay Company clerk at the Red River Settlement, preserved details of pemmican making in his books on frontier life. In 1840, the annual Canadian Métis buffalo hunt on the Red River filled 1,000 big-wheeled ox carts with 500 tons (450 metric tons) of pemmican. Because grass-fed stock and the addition of dried berries prevented scurvy, which weakens connective tissue from too little ascorbic acid in the diet, traders sold large amounts every year to boatmen of the Hudson's Bay Company. European settlers and soldiers augmented the Plains Indian recipe with beef jerky and suet and more berries, cherries, currants, and raisins to enhance the gamy flavor and increase saliva.

Pemmican as an Industry

Explorers relied on pemmican for trade gifts with Indians and as lightweight rations, which the British Royal Navy adopted as its primary sledging ration for polar exploration. Condensed meat contributed to the success of international explorers. A significant advantage of a pemmican-based diet, the reduction of bowel movements to once weekly reduced the risk of frostbite to exposed skin.

For packing condensed meat, John Richardson, a seeker of the Northwest Passage in 1825, made pemmican on a brewer's malting equipment. The Burke and Wills expedition of April 1861, on a north-south route across Australia, relied on pemmican as pack food or overland "sledging rations." Robert E. Peary, discoverer of the North Pole in 1909, valued pemmican as the sine qua non of survival food for its palatability and instant use; for a sled team, he recommended Bovril pemmican, a dog food marketed by Bovril Ltd. of London. For the arduous trek to the Arctic Circle, Peary carried only condensed milk, hardtack, pemmican, and tea. That same year, Ernest Shackleton boosted body heat among trekkers by purchasing Danish pemmican from Beauvais of Copenhagen, a canner of tinned meat, soup, and vegetables. Shackleton augmented the meat stash with glydin (processed protein), oatmeal, and sugar and ate it with hot cocoa to maintain energy levels on his route to McMurdo Sound, Antarctica. For traversing Greenland in 1924, Knud Rasmussen added rice and vegetables to the condensed

meat supply. From 1924 to 1925, Arctic adventurer Vilhjalmur Stefansson lived a full year on pemmican as a test of the Inuit all-meat diet.

Adaptations

In American, Australian, Canadian, Danish, Dutch, English, French, and Norwegian factories, the twentieth-century manufacturers tinkered with the nutritional makeup of Paleo-Indian condensed pemmican with the addition of dog meat, horse meat, sugar, and chocolate. To protect meat supplies from spoilage during Richard Byrd's Antarctic exploration in 1929, Dr. Dana Coman of Johns Hopkins Medical School formulated a new recipe for pemmican in collaboration with Armour and Company. The mixture included soy flour and brewer's yeast and ginger, pepper, and thyme as flavorings. In preparation for the Oxford University expedition to the far north Spitsbergen Island in 1934, Dr. Sylvester Solomon Zilva of the Lister Institute in London advocated bolstering pemmican with vitamin C as a deterrent to scurvy. Diners dubbed the resulting recipe Potage Antiscorbutique, the forerunner of K ration or Meal, Ready-to-Eat (MRE).

During World War II, the German and U.S. militaries experimented with pemmican as survival food, following the example of the British army, which had purchased pemmican from the Dutch and distributed it during the Second Boer War (1899–1902). U.S. nutritionists rejected the gamy flavor and questionable nutrition of condensed meat. To improve flavor, in the mid-1940s, biochemist Robert S. Harris, at the nutrition laboratory of Massachusetts Institute of Technology, experimented with supplements of beef liver, peanut butter, coconut oil, powdered milk, vigex (a mix of energizing herbs), calcium, and glutamic acid, a flavor enhancer. In 1956, for a British

[Recipe: European Pemmican](#)

Chop or grind a pound of dry beef jerky to a powder. Grind separately a cup of blueberries, cranberries, currants, figs, raisins, or dried apples,

apricots, or cherries. Mix the meat with the fruit. (Optional: Add honey, sunflower or other seeds, and/or unsalted nuts.) Cut a pound of beef suet into chunks and melt over a low fire. Filter and cool the tawny-colored liquid until it turns white. Reheat the beef-and-fruit mixture and pour the liquid fat over it. As it cools, mold into bars or blocks and wrap in waxed paper or zip into plastic bags.

A half pound of pemmican per day supplies the adult dietary need of 1,500 calories. For grueling exertion, such as portaging, snowshoeing, or mountain climbing, the daily average increases to 3/4 of a pound or 1 pound per day.

expedition to the Ross Sea, Cadbury, a food manufacturer in Dunedin, New Zealand, produced pemmican for sled dogs from dehydrated meat, meal, whole wheat and wheat germ, tallow, treacle, and cod liver oil. In the first decade of the twenty-first century, vegetarians proposed a meatless pemmican recipe consisting of equal parts peanuts and hickory nuts, cornmeal, pumpkin or squash, maple syrup or honey, raisins, and dried apples.

See also: Biscuit; Hudson's Bay Company; Industrial Food Processing; Religion and Food.

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[Pennsylvania Dutch Diet and Cuisine](#)

Pennsylvania Dutch cuisine of the central and southeastern sectors of the state expresses the unpretentious, robust diet of Huguenot, Jewish, and Mennonite Rhinelanders. Emerging from an agrarian culture of Deutsch, or German, immigrants fleeing religious persecution in Alsace and the Palatinate, “plain” people made up one-third of the state’s population as early as 1683. As befits a folk culture, they ate from the land. Cooks bought little at grocery stores beyond coffee, pepper, salt, and sugar. They gathered mint and pennyroyal to dry for tea and chickweed for pie; they made their own baking powder and reduced horse radish and mustard into table condiments to serve with fresh shad and oyster stew.

A modest addition to North American cookery, Pennsylvania Dutch food nourished citizens at turning points in history. During the winter of 1777–1778, the Dutch *schnitz* pie, made from dried apples, solaced hungry Continental soldiers for breakfast at Valley Forge. Peasant open-hearth cookery in copper cauldrons and food preservation in jars appeared in print in 1848 in America’s first ethnic cookbook, *Die Geschickte Hausfrau (The Housewife’s Tale)*, a collection of high-calorie dishes acquired by a recipe pirate, Gustav Sigismund Peters. To suit the language of 40 percent of the regional populace, he wrote in German, the language that isolated the newcomers from their English neighbors.

During the Civil War, rural table customs earned local people the name “Sauerkraut Yankees,” a reference to their taste for savory meals. Legacy recipes, originally inscribed in the Pennsylvanisch dialect, make use of such homemade foods as cassia-spiced pickles and ham

[Recipe: Wilted Lettuce](#)

Pick and wash fresh lettuce and salad greens. Break into bite-size pieces. Snip bacon into 1/2-inch pieces and fry to a crisp. Remove the bacon, reheat the drippings, and add an equal amount of tarragon vinegar. Return bacon to the pan and pour the dressing over the greens.

with schnitz (dried apples) and dumplings. To the elongation of table talk, hosts removed crullers, *fastnachts* (doughnuts), and *lebkuchen* from outdoor brick ovens and shared their sweets for dunking in hot black coffee.

On self-sustaining farms, traditional cooks focus on humble substances as handy as molasses and dandelion greens. Ingenuity transforms the ordinary into a filling comfort food as common as shoofly pie with elderberry wine and walnut mooschi (candy) and as winter hearty as *kubelis*, a casserole of bacon, onions, and potatoes. Kitchen crews dole out ingredients in pinches and dabs rather than standard measures for such traditional foods as corn pie for harvesters and sausage gravy, a breakfast staple thickened with spelt flour. Examples of food recycling range from scrapple (pork scraps in corn mush) and stuffed hog maw (pig stomach) to chowchow, an end-of-the-garden relish that house keepers can in early fall from odds and ends of the vegetable patch. By balancing sour with sweet, cooks enhance the flavors of community favorites, such as a dinner of pork shoulder and sauerkraut served with biscuits and apple or grape butter. For toddlers and the sick, servings of buttermilk corn bread and baked custard turn dietetic meals into savory treats.

Following the “seven sweets and seven sour” principle, Pennsylvania Dutch cooks retain the customs of Hungarian, Jewish, and Scandic cuisine. Their cookbooks delight the senses with foods that present interesting textures and colors, along with the vivid aromas and tastes found in *hasenpfeffer* (rabbit stew), rhubarb crumb pie, birch or lager beer, and cup cheese (a soft, spreadable cheese). Traditional preparers apply a hands-on method of crumbling rivvels (stringy dumplings) into chicken stock for soup and drizzling batter through a funnel for a fried *drechter kuche* (dough cake). To ensure a supply of workable ingredients, householders value root crops, dried corn, buckwheat, sour cream, and vinegar.

A unique population, the Amish contingent of Pennsylvania Dutch consists of some 16,000 living in Lancaster County and preserving the culture of Swiss Anabaptists. After settling on farms, they turned staples—eggs and poultry, apples, corn and potatoes, wheat and barley—into appealing dishes for *Nachtesse* (night eating). Central to kitchen work, the preparation of fresh chowders, creamed cabbage, and spiced lemonade replicates food peeling, chopping, and grating that date back to the European practice of making the most out of edibles. Girls learn to turn apples into cider and jelly, fresh roasting ears into dried corn,

and milk into *schmierkase*, a light cottage cheese.

Family gatherings for school holidays or a wedding involve preparation of favorites, such as snow cream, raisin pie, and pickled green tomatoes. To maximize flavor, cooks fry in butter or leaf lard, sandwich meat between slices of pumpernickel and rye bread, and top coleslaw and leaf greens with hot savory bacon dressings. Baskets and platters of food tempt diners with the shapes of potato croquettes and pig's knuckle dumplings and the aroma of roast duck. Amish food markets specialize in Lebanon bologna and whoopie pies, traditional fare that holds a unique spot in ethnic American cuisine.

See also: Appetizers and Hors d'Oeuvres; Breakfast; Noodles; Pickling.

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Peppers

The *Capsicum* and *Piper* pepper families impart zip and heat to a broad range of world cuisines, allegedly adding years to life and sexual potency. The *Capsicum* pepper originated in Bolivia in the Amazon River basin around 7500 B.C.E., producing some 25 species. Peruvians domesticated the habañero chili after 6500 B.C.E. and added its blossomy fragrance and lemony taste to mescal, an alcoholic

drink later distilled from agave in Oaxaca, Mexico. By 4000 B.C.E., kitchen gardens in Ecuador featured *Capsicum* pepper patches as sources of food, aphrodisiacs, and antifungal, antimicrobial, and antivermin agents.

Mesoamericans discovered that *Capsicum* peppers produce capsaicin, an alkaloid that stimulates appetite and digestion by increasing the flow of gastric juices. The hottest flavors emerged from the habañero, Naga, and Scotch bonnet, which, on the Scoville scale, ranks 300,000 times hotter than the bell pepper. Cooks dried pods with smoke or sunlight, turning the jalapeño into chipotles for grinding into a musky paste to enliven braised meat, chocolate beverages, soups, and stews. Poblanos, either roasted, sliced, or dried as anchos, added flavor to finger foods and garnishes and to *mole poblano* (pepper sauce) and stuffings for poultry.

Misidentified as black pepper by Christopher Columbus on his first voyage to the New World in 1492, the bell pepper or chili pepper (*Capsicum annuum*) originated in Mexico and Panama. The species that Columbus sampled in Hispaniola contributed a crisp bite to salads and finger foods and intense tang to paprika, the powdered form of chili. By 1493, he had already plotted how to export 50 shiploads of sweet peppers annually to Spain.

Mouthfeel and sweetness varied according to terroir, the combination of weather and topographical growing conditions, which ranged from eastern Asia to Ghana, Holland, and Romania. Basque cooks became the first Europeans to develop a fiery cuisine based on dried and pickled peppers and to sell peppers to Africa, the Levant, and the Far East. Spaniards developed the red *choricero* variety at Vizcaya for use in chorizo sausage. Hungarians turned paprika pepper into their national table condiment, particularly for flavoring cracked wheat, fried onions, eggplants, and meat stew.

Black Pepper

Unlike *Capsicum* stock, *Piper* has a shorter history, beginning on the Malabar coast of India around 2000 B.C.E. and becoming the world's most popular spice. Egyptians valued pepper as early as 1550 B.C.E. After 1000 B.C.E., pepper vines became a standard addition of home gardens and the least expensive flavoring at

farmer's markets. By the 800s B.C.E., Arabs were dispensing *Piper cubeba* (bitter pepper) as a treatment for infertility and an antidote to poisoning and introducing pepper to European cooks. Arab traders guarded the secret of where and how they acquired peppercorns for sale.

Both the Greeks and Romans valued *Piper longum* (long pepper) and *Piper nigrum* (black pepper). Shipments traveled from India inland by caravan from the Arabian Sea over the Silk Road and by ship from the Red Sea and barge from Alexandria across the Mediterranean Sea. The lengthy journey from Baghdad through Constantinople and Venice increased the cost of pepper, which, throughout the Crusades, remained higher in value than gold. Profits benefited China and elevated Venetian markets to one of the world's more lucrative trading centers.

In the 1500s, the Portuguese diminished the control of southern India on the pepper trade. Navigators transplanted Indian pepper vines to Java, Madagascar, and Malaysia, favoring the mildly fragrant Lampong black and fruity Sarawak black over the bolder Tellicherry black from southern India. European demand for black pepper inspired the voyages of discovery that preceded Portuguese colonies.

After 1602, the Dutch East India Company monopolized commerce in black pepper for 167 years. The harvesting of black pepper from Goa focused on land planted in areca nut, betel palm, or mango trees on which pepper vines grew. During the three-year wait for a first harvest, workers stitched hemp sacks. Pepper berries required a month's drying period before packing and warehousing for sale. Indian aficionados turned pepper oil into a massage emollient for Ayurvedic healing. By 1629, wealthy American colonists imported black pepper for table use. In 1750, the French East India Company transplanted Javanese pepper vines to Mauritius, Réunion, and the Seychelles.

In 1769, Danish, English, and French traders seized control of Dutch spice routes and sparked a rush of investment in the pepper market. The British East India Company imported so many peppercorns to Europe that the price fell to an amount that ordinary citizens could afford. From that time, pepper held second place to salt as the most common food seasoning.

Use in Recipes

Capsicum and *Piper* peppers made vast changes in Asian cuisines, alarming Buddhists with the inflammation of human passions. Black pepper gave Chinese beverages and sauces a pungency and lasting aftertaste. In the late 1600s, the transport from South America of hot chili peppers, either whole or in flaked or powdered form, introduced the basis for Szechuan cuisine. Guinea peppers (cayenne), either plain or added to a vinegar sauce, topped the surface of fish and meat with a spicy flavor. Seventeenth-century naturopath Nicholas Culpeper summarized numerous uses for cayenne for treating colds, coughs, stings, tremors, and tumors.

From Bantam (now Banten), Malaysia and the Indian subcontinent acquired the extra-hot long pepper, a staple of Indonesian gastronomy and of Indian curries and vegetable pickling. Bhutanese recipes flavored cheese with chili peppers. Filipino cooks valued pepper plant leaves as greens and flavorings for chicken soup. Koreans fermented the leaves in *kimchi* (pickled vegetables). Thai pepper processors dried green pods for their fresh, vivid taste and bottled chili sauce blended with garlic, salt, sugar, and vinegar for seafood dips and saucing spring rolls.

Americans made their own discoveries about peppered dishes, including chili con carne, jalapeño poppers, and pork sausage, as well as patent medicines such as Stanley's snake oil. With red pepper flakes, an inexpensive substitute for black pepper, pioneering cooks turned out Cajun jambalaya, chowchow, Jamaican pepper pot, ketchup, okra and pepper pickles, sauces, and sawmill gravy (white milk gravy). Later experiments resulted in distinctive recipes exhibiting immigrant specialties, such as adobo rub for beef and chicken, Creole bouillabaisse (fish stew), Cuban sandwiches, salt-and-pepper catfish, Szechuan bean sauce, shaker blends for topping pizza, and hot sauces.

See also: New World Commodities; Szechuan Diet and Cuisine; Tex-Mex Diet and Cuisine; Trading Vessels.

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[Persian Diet and Cuisine](#)

Arising from central Asia north of the Fertile Crescent in 2000 B.C.E., Persians developed a colorful culture based on a profusion of foods adapted and refined from other lands. Beginning with the Medes in 1000 B.C.E. and advancing to the Achaemenid Empire in 550 B.C.E., Persia grew into the largest and most hospitable empire of the ancient world. The Achaemenid kings observed the classical world's respect for the host-guest relationship. Agronomists imported Babylonian sesame, Anatolian fruit trees, Syrian pistachios, and alfalfa seeds from the Mediterranean and watered them with underground irrigation systems. Careful governmental control and stockpiling prevented the famines that beset other Asian lands. Except for irrigation failures, food prices remained stable.



A medieval illustration from the *Shahnameh* (*Book of Kings*, ca. 1010), the national epic poem of Iran, depicts the Golden Age of Paradise. Men and beasts enjoy the fruits of the earth—a metaphor for the rich abundance of foods in classical Persian culture. (*UniversalImagesGroup/Getty Images*)

Around 870 B.C.E., King Ashurnasirpal held a ten-day festival at Nirum and invited 47,074 Assyrians for a display of imaginative, plentiful cookery. The purchase of Indian rice inspired meticulous soaking and steaming to produce separate aromatic grains. Under Judaic law, the people avoided Egyptian luxuries, favored Persian eggplant and spinach, and ate no waterfowl and only those animals named in the Torah. For freshness and taste, hosts offered platters of plain herbs, mixing chives, cilantro, and cress with dill, mint, radishes, scallions, and tarragon. From the legend of Esther's feast for King Xerxes I, Jews derived the feast of Purim.

Around 430 B.C.E., Herodotus's *Histories* reported the simplicity of Persian sacrificial meals as contrasted with court pomp. Herodotus noted that Darius the Great kept a phalanx of food researchers who combed the outside world for rare and different taste sensations, such as garlic from Cyprus. Xerxes, Darius's son, expected such grandeur at meals that when he visited other cities, he left them in

ruins. For a royal birthday, chefs roasted whole camels, donkeys, horses, and oxen. Interspersed between entrées, they served desserts. Guests, who drank themselves into a stupor, showed fondness for foreign customs, particularly forms of pleasure.

Celebrating Food

At the height of the Persian Empire, stewards employed confectioners, cupbearers, and sommeliers to carry entrées and sherry to the table of Darius. At Persepolis, grand processions accompanied platters of ostrich breast and roast camel. Cooks spread colorful feasts of tasty, nutritionally balanced dishes heady with aroma and served with flat-breads. Persian kitchens, equipped with mortar and pestle and soup cauldrons, introduced basil and coriander, almond and pistachio sweets, sweet and sour sauce, pomegranate juice, and kebabs. They flavored eclectic rice recipes featuring cinnamon, garlic, lemon and lime, nuts, onions, parsley, pomegranate seeds, raisins and prune, and saffron. According to astronomer Berossus, a priest of Bel Marduk who compiled the *Babyloniaca* (*History of Babylonia*, ca. 290 B.C.E.), God blessed the Tigris and Euphrates region with abundant foodstuffs as a sign of his blessing.

Subsequent expansion augmented Persian cuisine in the third century C.E. with chicken, cucumbers, peacocks, sugar, and walnuts. Caravans introduced Chinese tea, apricots, peaches, and rhubarb to be served on gold and silver plate. Wine from gold carafes filled the king's rhytons, horned cups with animal-shaped bases shared with the royal cup-companions. The Sassanians of the third to the seventh centuries favored intense flavors,

[Recipe: Cold Stuffed Dolma](#)

Steam 1 cup of basmati rice. Simmer with three chopped tomatoes, one chopped onion, and 2 tablespoons each of snipped mint and parsley. Flavor with a pinch each of allspice, cinnamon, pepper, and salt. Place 1/2 pound of fresh grape leaves in a bowl and blanch with boiling water. Spread the

leaves flat, with the vein side up. Stir two chopped tomatoes into the rice mixture. Roll 1 tablespoon of mixture in each leaf, with the stem end pointed to the middle. Squeeze out any excess juice. Chill and serve with a topping of raisins and a dollop of yogurt.

including ox meat cooked in beef bouillon and rabbit ragout. The chefs of King Khosrow I served succulent stews with cold soups, candied lozenges, apple and quince jelly, sherbet, and nut pastries. Blending produced unique combinations of coconut with pistachio, infant lambs stuffed with dates and raisins, parsley soup with green plums, lamb hearts in cinnamon, and dates with peaches and nuts. Queen Pourandokht instructed her chef to serve *borani*, vegetables in yogurt. King Khosrow II and Queen Shirin carried triumph to excess in Alexandria, Antioch, Damascus, and Jerusalem and lavished huge sums on date puree, jellied rice, mutton with pomegranate sauce, rice pudding, spit-roasted hen fed on hemp seed, and stuffed grape leaves. For the poor, the queen, a native of Armenia, commanded charity serving of *harissa*, a wheat porridge flavored with fat and sugar.

An End to Excess

In 656, Arab invasions ended the hedonism of the Sassanid Empire and replaced it with Bedouin pastoral diet—barley gruel, game, milk, mutton, onions, palm hearts, and wild berries. Opulence and spicing disappeared from recipes, as Arab traders transported luxury goods to Italian markets for profit. Zoroastrian harmony of opposites in cookery, such as mint and vinegar sauce on lamb, gave way to less refined Islamic culture. (After Arabs completed a hasty meal standing up, they licked their fingers in the manner of the prophet Muhammad.) With the rise of the Abbasid dynasty, the Islamic Golden Age, Arab recipes adapted to sophisticated Persian tastes and aromatics. Cosmopolitan cuisine at Baghdad, the center of the Abbasid culture, revived classical cuisine. Cooks added dates and figs to lamb dishes and heightened visual appeal with saffron and turmeric. To basic flavorings—coriander, mint, parsley, and sesame—chefs added lavender, mallow, purslane, rosebuds, rue, tarragon, and thyme. Under the influence of

Harun-al-Rashid in 786, subtle cuisine became a Persian art form praised by caliphs, poets, princes, and scholars. The creation of inspired stuffed vegetables and tiny pies and praise anthems sung by revelers raised the banquet to the height of celebration and sensuality. Connoisseurs issued handbooks of table pleasures. Specialists advised on regulating human moods and physical constitution with dietetics, which recommended blends of lentils with spinach to strengthen the sick. The elegant bounty of Persian cuisine influenced cookery in India and Turkey and spread flavored pilaus to the royal courts of medieval Europe.

In 1226, Baghdad cookbook compiler Mohammad ibn al-Hasan proclaimed gastronomy the height of the noble life. Meals begin with the host's proclamation, "Bismillah" (in the name of God), followed by silent eating. The king of Persian entrées, *narinj pilau*, is a rice dish flavored with almonds, orange peel, spices, and sugar. Diners sat cross-legged on an ox hide or cloth, receiving Caspian caviar or feta cheese served on flat bread and picking apart a roast partridge, quail, or fat-tailed sheep with the fingers. More difficult, the scooping of stuffed gourds with the right hand and rolling it into a ball demanded that no morsel fall to the cloth. Meals concluded with heaps of seasonal fruits and melons. Servants prepared sherbet, a cooling blend of lemon, orange, or pomegranate juice or willow flowers poured into a decanter with water and lump sugar topped with ice or snow. Fruit became so essential to thirst quenching that women and children carried fruit baskets to the public bath and gorged on grapes, oranges, peaches, and pomegranates and sips of rosewater. For health, families dined daily on melons and cow, goat, or sheep milk yogurt.

All levels of society thrived on fresh staples and ate by moonlight on their house tops, chatting across the way with neighbors. In winter, they put a carpet over the oven and sat at the edge to enjoy warmth and hot food. Servants fed on the master's leftovers. The poorest muleteer or nomad dined only a few times of the year on meat and subsisted primarily on barley or rye bread, cheese, and dates with occasional curds, hard-cooked eggs, and soup for a treat. Urban peasants lived on similar fare augmented with apricots, cucumbers, grapes, lettuce, and onions. For breakfast, they added molasses to clabbered milk. To preserve milk solids, they boiled butter and decanted the oil into clay pitchers, where it remained fresh for up to two years. Bazaar dining consisted of slices of

whole roasted sheep and mutton, onion kebabs, and pickled cauliflower and cucumber sticks wrapped in bread. With the Mongol capture of Baghdad in 1258, religious puritanism supplanted Abbasid brilliance. The poet Shams Hafiz shamed his host Ali Agha Isfahani for serving excesses of food, which Shams considered an embarrassment of wealth.

See also: Athenaeus; Breakfast; Fertile Crescent Diet and Food Trade; Nuts and Seeds; Soft Drinks and Juices; Trade Routes.

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[Peyote](#)

The Native American Church, the largest Indian religious constituency, reveres the sacramental consumption of powdered mescal, peyote tea, or fresh peyote buttons, a bitter, non-habit-forming alkaloid. The spongy, spineless knob of the *Lophophora williamsii*, a gray-blue-green hallucinogen of the cactus family indigenous to the Pacific coast of Mexico and the Lower Pecos region of Texas, gained sacred status from around 8500 B.C.E. and flourished among the Lipan Apache and Tonkawa. Peyoteros (suppliers) made pilgrimages into the Chihuahua Desert to collect the cactus. Users consumed from four to twelve buttons, either fresh or dried for steeping into a tea.

European proselytizers targeted peyote consumption as sacrilege. In 1521, Catholic missionaries outlawed the eating of hallucinogenic mushrooms and peyote. According to Spanish chronicler and Franciscan friar Bernardino de

Sahagún in 1560, the Aztec, Chichimeca, Huichol, Mexica, and Navajo, the plains tribes of the Rio Grande basin, and the Tarahumara of central Mexico continued to chew peyote buttons as part of pagan ritual. Into the mid-eighteenth century, Catholic priests condemned the use of peyote by prophets for divination.

In the 1850s, the near extinction of the buffalo and genocidal forays by the U.S. cavalry spread despair among the Apache, Caddo, Comanche, Kiowa, Shoshone, and Toltec. Shamans sought the holy herb and disseminated cultic ceremonies west to the Ute and north into the Canadian plains. Because of the rapid growth of peyotism, Congress in 1918 outlawed the cult. To secure constitutional rights to traditional folk worship, priests incorporated the Native American Church. In 1923, the outlawing of peyotism in Montana resulted in arrests of worshippers for eating a hallowed controlled substance.

After resettlement in Indian Territory (Oklahoma), the Kickapoo, Kiowa, Shawnee, and Wichita popularized religious peyote ingestion, which engendered euphoria and the illusion of timelessness for a 10-to 12-hour period. The most powerful plant in native herbalism, peyote offered users a substitute to debauchery from alcohol and marijuana.

Currently, some 400,000 Native American Church members value the cactus as a source of introspection; healers recognize the worth of peyote to heal infection and to relieve pain and the effects of asthma. Accompanying the holy cactus meals, priests heal the sick and conduct seances and visions while celebrants chant and dance to all-night drumming. The ritual inspires reverence for the Mother Earth and the harmony of human life with nature. Lakota midwives prescribe peyote for parturient women during labor. In some states, Christian proselytizing and antidrug laws contravene claims of religious freedom to ingest the psychotropic mescaline in peyote.

See also: Wild Food.

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[Phoenician Diet and Cuisine](#)

A Semitic merchant culture from 1200 to 333 B.C.E. at Byblos, Sidon, and Tyre in present-day Lebanon, the Phoenicians, known in the Bible as Canaanites, enjoyed a varied diet from imported livestock and trade goods. To supplement their narrow strip of arable land, they depended upon the first navigator-trader relationship with the Far East. From Greece and Egypt, their commercial vessels carried bags of grain and sea salt, chests of saffron, and amphorae—two-handled jugs that ended in a knob for ease of pouring—of olives, olive oil, and wine.

In a string of city-states, working-class Phoenicians tended toward informal meals of finger food. Hearty cuts of garlic-flavored goat and lamb accompanied slices of

[Recipe: Cucumbers in Yogurt](#)

Peel and dice four large cucumbers, and mix them into 1 cup of plain yogurt and 1 cup of sour cream. Add 1 tablespoon of fresh chopped mint, 1 teaspoon of sea salt, a sprinkle of dried dill, a few drops of tarragon vinegar, and one minced garlic clove. Chill and serve with pita triangles as a side dish to grilled fish or lamb kebabs.

dried bream and mullet, cheese, honeyed bread, and melons and berries, all of which suited the limited galleys and tableware of trading coasters. For seafarers, almonds, chestnuts, hazelnuts, pistachios, and walnuts served as pocket snacks.

Fish, mutton, poultry, and snails served the needs of ordinary citizens. Fed sophisticated dishes by Cadmos, the chef of King Agenor of Sidon around 2000 B.C.E., aristocrats demanded excellent fare served on distinctive faience and red slip pottery. They afforded pantry exotica from Egypt, Greece, Mesopotamia, Sardinia, Sicily, and the Atlantic coast of Spain with the profits of the purple dye they made from the *Murex brandaris*, a tidal sea snail. At natural salt pans, they preserved sturgeon and tuna as well as moray eels. From fish parts and entrails, food processors fermented *garum*, a sauce used as a condiment and popular trade item. The wealthy enjoyed game and the occasional dolphin served with cardoons from Cartagena, Spain.

Until Alexander the Great killed 10,000 Tyrians and sold 30,000 into slavery in 332 B.C.E., the famed Phoenician navigators developed a service economy that bought and sold barley and wheat from Palestine and Syria. The Romans identified *puls punica* (Phoenician cereal) as a boiled porridge stabilized with chicken or ostrich eggs and flavored with cheese and honey. Daily dinners based on dairy products with *punicum* (flatcake) paired with olives, a Mediterranean staple. Phoenicians also favored beer with bread and pulses blended from broad beans, chickpeas, lentils, and peas.

As farmers, Phoenicians excelled at orchardry and vegetable gardens. Until overpopulation sapped their food supply, they stocked rows with artichokes and cabbages and sowed corn, cucumbers, and herbs. In addition to grapes and raisins, they produced delectable dates and figs, which they used as fresh or dried sweeteners, an alternative to costly honey.

In a 28-book treatise in Punic, Mago the Carthaginian, the “Father of Husbandry,” summarized regional winemaking, beekeeping, and the harvesting of fen sedges and wetland reeds and rushes. He described the preservation of fresh pomegranates by parboiling and drying or by coating in clay. Another method involved packing the succulent globes in sawdust in a clay pot and sealing it for later use. Phoenician wine gained respect in Carthage as a part of religious ritual. As a burial ritual, mourners placed plates of food and jugs of wine beside the funerary urns of the dead.

See also: Fish and Fishing; Maritime Trade Routes; North African Diet and Cuisine; Trading Vessels; Yeast.

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Physic Gardening

The physic garden, an herb bed producing medicinal plants for healers and druggists, offers edible flora for aromatherapy, fumigation, nutrition, disease prevention, and restorative teas. Historians date the earliest garden to Karnak in central Egypt in 1400 B.C.E., when priests cultivated aloe, myrrh, and opium poppies alongside a kitchen bed. St. Anthony introduced medicinal gardening at Faiyum in northern Egypt in 305 C.E. as a source of culinary herbs and “simples.”

Most plant knowledge preceding the Middle Ages remained anecdotal, transferred from one apothecary to another during apprenticeship. Gradually, texts such as Hildegard of Bingen’s *Physica (Medicines)*, ca. 1152 and Albert the Great’s *De vegetabilibus (On vegetables)*, 1259 codified the role of biodiversity in medical treatment. The basis for kitchen economy and the chemical analysis of food substances, plant research offered solutions to appetite stimulation in invalids and to hospital diets for surgical patients.

In the tradition of Greek and Roman herbaries, medieval monasteries, such as the ninth-century Benedictine *herbularium* (healing garden) at St. Gall in Switzerland and the twelfth-century Cistercian garden at Grey Abbey, Ireland,

cultivated infirmary herb beds to provide medicines and nutrients. Infirmarians preferred gentle curatives, such as disinfectant rue and bitters from lovage leaves and yarrow tea for the sick and infirm. Outside sacred precincts, monks scoured meadows and hedgerows for endive, leeks, pennyroyal, rocket (arugula), sweet clover, and wild onions and parsnips, common ingredients in meatless broth.

Renaissance universities institutionalized physic gardening, beginning in Pisa in 1543 and in Florence in 1545. At Padua, lecturer Luca Ghini invented the herbarium, a catalog of dried plant specimens. In 1587, the town of Leiden, Holland, founded a teaching garden for use by medical students at the University of Leiden. With donations from the Dutch East India Company, Flemish botanist Carolus Clusius expanded the original plot to 1,000 plant specimens, some sent from Dutch trading centers in Japan. A Chinese original, the *Ginkgo biloba* tree produced nuts used in pudding and Buddha's delight, a vegetarian mélange favored by Buddhist monks for alimentary canal purification.

England began isolating beneficial plants at Oxford University in 1621. Five years later, Louis XIII founded the Jardin Royal des Plantes Médicinales in Paris. Scotland followed in 1670 with the Edinburgh botanic garden, an array of 15,000 plants encompassing algae, ferns, and fungi for the instruction of apprentice apothecaries and surgeons. The importation of curiosities from world voyages gave rise to speculation about the healing and dietary properties of breadfruit, cassava, castor oil, and quinine (extracted from the bark of the cinchona tree).

In 1673, the 4-acre (1.6-hectare) Chelsea Physic Garden in London applied to healing the botanic skills of the Worshipful Society of Apothecaries. In 1682, members established a seed exchange with the Leiden Botanical Garden in the Netherlands that extended pharmaceutical knowledge of alpine plants and nutritional herbs. Gardeners developed world medicine beds featuring stock valued in Ayurvedic and Maori medicine, among Native American shamans, and as curatives in China, northern Europe, and South Africa. Labeling differentiated plant parts relevant to the treatment of cancer, eye disease, parasitology, and psychiatry.

In 1722, Scots botanist Philip Miller, the chief gardener and author of *The Gardeners Dictionary* (1741), increased the range of known therapeutic and nutritive plants from varied climates. He cataloged barrels of evergreen stock dispatched by naturalist John Bartram from Pennsylvania. Each year, the Chelsea

Physic Garden presented the Royal Society with 50 curative herbs from 2,000 plants. The stock supplied garden curator Isaac Rand with remedies for his *Index Plantarum Officinalium* (1730).

Scots illustrator Elizabeth Blackwell settled at Swan Walk near the Chelsea garden to draw 500 specimens for *A Curious Herbal* (1737–1739), a valuable medical text. Her hand-painted copper plates featured the cantaloupe, chamomile, coffee, cucumber, and sassafras, an American Indian staple cooked in gumbo, used to flavor root beer, and steeped as a tea. Her edibles showcased the physic garden's stock of catnip, chicory, medlars, olive trees, pomegranates, saffron, and tea. She depicted figs for syrups, grapes and hot peppers to whet appetite, quince for jelly, radishes to cure scurvy, Saint-John's-wort as an additive to wine, and dandelion, nettles, rosemary, and tomatoes, common salad and stew ingredients.

Other physic gardens, such as the *jardin potager* (soup garden) at Cowbridge, Wales, and beds of simples at the University of British Columbia, illustrate the close connection between plant science and food. Gardeners placed *materia medica* at hand for application to disease. At Pennsylvania Hospital, North America's first colonial hospital, the indigenous plantings begun in 1774 attest to the orderly arrangements of gardener Adam Kuhn, the school's first professor of botanic pharmaceuticals and director of vegetable and diet research.

See also: Curative Foods; Herbs; Manioc; Medieval Diet and Cuisine.

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Pickling

A food conservation method dating to Mesopotamia in 2400 B.C.E., pickling in brine prevents spoilage by replacing natural liquids with preservatives. Whether hot, salty, spicy, sweet, or vinegary, the solution excludes oxygen while producing an acid marinade that sours by lacto-fermentation. From early time, pickling made available such seasonal vegetables as cucumbers and cauliflower for long sea voyages and lemons and peaches for nomadic journeys.



The mason jar, which features see-through glass strong enough to withstand boiling and a lid that seals the contents in a vacuum, revolutionized home canning and pickling after its invention in 1858. (*MCT/Getty Images*)

Pickles accompanied Roman legionaries into Gaul in 58 B.C.E. and Napoleon's forces in France and Belgium in 1809 and protected pioneers from scurvy along the Oregon Trail in the mid-1800s. In lieu of a varied menu, cooks valued pickles for their color and their aid to appetite and digestion. Dieticians recognized that pickling increases B vitamin content.

The development of condiment recipes parallels the global food exchange that followed early sea ventures. In 900 C.E., the transfer of dill seed from Sumatra to Western Europe introduced a distinct pickle taste. Allspice, asafetida, caraway, cumin, and turmeric contributed unmistakable aromas and bite to otherwise

bland vegetable condiments. Christopher Columbus introduced the European pickled cucumber in 1494 in Haiti, where he planted the first seeds.

In the 1500s, Dutch merchants in the Hudson River valley supported New York's commercial picklers, an outgrowth of colonial preferences for piquant flavor and crunch. Colonial house keepers treasured recipes that allotted the bay leaf, ginger, horse radish, mace, and nutmeg to pickling crocks. To save money, picklers replaced costly sugar with small amounts of herbs and spices.

Pickling targeted perishables in traditional cuisine— beets in Romania, bitter melons in Thailand, cabbage in Korea, capers in France, chili peppers in Mexico, eggplant and garlic in Greece, mushrooms in Britain, olives in Spain, radishes in China, and turnips in Japan. Fruits, too, adapted well to marinade, such as lemons in Israel and mangos in India. Picklers also brined sources of protein, including almonds in Turkey, butter in Scotland, cod in France, eels and walnuts in England, eggs in Pennsylvania Dutch territory, herring in Scandinavia, river snails and shark in China, seabirds in Iceland, and whale among the Inuit. Italy created a unique blend of carrot, cauliflower, onion, and pimiento pepper for *giardinera*, a colorful mix for serving with antipasti and meat dishes.

The mechanics of pickling offered three methods— fermented, fresh pack, and heat pack, or pasteurized. See-through jars improved processing in 1858, when Philadelphia tinsmith John Landis Mason patented thick glass strong enough to withstand the boiling that rids foods of bacteria. The use of pure pickling salt created a niche market for salt makers.

Cooks held lids in place with wire bails or galvanized metal screw-on caps until 1881, when Indiana inventor

[Recipe: Olive Spread](#)

Rinse and drain a 16-ounce jar of *giardinera*. Coarsely chop in a food processor and set aside. Coarsely chop 1 cup of mixed green, black, and kalamata olives with 1 cup of celery. Blend into the *giardinera*. Flavor with the juice of one Meyer lemon and 1 teaspoon of dill weed. Serve cold with crackers and pita triangles.

Alfred Louis Bernardin designed a canning jar lid suited to high-acid foods. At the domestic tents at county and state fairs, the bright colors and shapes of green tomatoes, okra, and watermelon rind pickle generated interest in canning displays.

In 1893, at the height of North America's pickle mania, Henry J. Heinz featured 57 pickle varieties. That same year, William Moore and food processors in St. Charles, Illinois, formed the Pickle Packers International. Independent German, Italian, and Polish street vendors pushed barrows through urban ghettos and dipped gherkins and dill pickles from stone crocks for use in potato salad and pastrami sandwiches. At baseball games, the purchase of a hot dog with mustard and pickle relish contributed to the American flavor of the sport.

See also: Salt; Sausage; Scandinavian Diet and Cuisine; Tudor Diet and Cuisine; Vinegar.

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[Pit Cookery](#)

Pit cookery dates to pragmatic solutions to problems with open-flame heating methods. Before the crafting of earthen cook pots, the simplest human settlements developed around earth ovens, evidence of hunter-gatherer ingenuity for baking bread or smoking and steaming vegetables and meat. The use of a

confined heat source reduced the need for fuel and freed the cook from shielding foods from burning or drying out. Pit cookery encouraged sophisticated flavoring and allowed the cook to roast more than one food for a meal. Because of the control that sealed earth craters afforded women, they remained free to tend their children and pursue crafts.

Moroccans and the Tuareg of the Sahara Desert as well as the Pintubi of Australia and the New England Penobscot applied pit hearth cookery to the logistics of feeding an army or to the needs of a celebration or ritual dinner, such as a clambake or a kangaroo hunt. The communal style of pit cooking incorporated whole villages in digging a pit, selecting stones, and gathering firewood and succulent plants for layering.

As applied by the Cochise culture of Arizona in 8,000 B.C.E. and the Basket Maker peoples of the Rio Grande in 7000 B.C.E., a steaming crater symbolized the cooking of game and agave close to the heart of Mother Earth. To retain flavor, diggers of the pit removed soil about three times the mass of the food and lined the hole with dry flat stones before lighting slow-burning hardwood. After the stones heated with coals filling half the crater, cooks tamped sand over the embers and sealed boned meat in moist camas bulbs, cactus pads, dandelion greens, seaweed, or watercress to prevent burning.

The last stage involved moistening the greens and sealing the top with bark slabs and earth to slow the cooking process to six to eight hours. Whole pigs or venison slabs or, among the Inca of Chile and Peru, a whole llama, took up to 12 hours. In contrast, at Ballyvourney in southern Ireland, the roasting of deer or mutton in a damp peat trough around 5000 B.C.E. took only four hours.

From the Bedouin of Egypt and Arabia, pit cookery advanced among the Persians and passed to Afghans and the Harappans of India around 3000 B.C.E. In marginal territory offering few combustibles, the method retained steam with little fuel to tenderize game birds and haunches of meat. To incorporate bread with the meal, cooks placed the meat in a tandoor pot to be sauced with yogurt and sealed with chapati dough. For flavoring, they ground cardamom, chilies, clove, coriander, garlic, ginger, lime juice, mint, onions, and peppercorns into a paste and slathered it over the meat. In a simpler tradition in Sardinia, pit roasters preferred myrtle wood for flavoring pork.

By shielding hot coals in a depression in the ground or among rocks, cooks in

rural India slowed the burning of combustibles to retain natural juices. Attendants increased the flame by blowing into a reed or tube to maintain the temperature for adequate roasting. Because the in-earth cuisine gave off no visible smoke, sheep rustlers in Crete could hide their thievery from herders.

Across the Western Hemisphere, reusable earth ovens layered with leaves or seaweed contributed a smoky savor to slow-roasted meats and shellfish. In Peru, the addition of cassava, roasting ears, sweet potatoes, or tamales rounded out *pachamanca*, an Inca specialty dominated by guinea pig, pork, or poultry. Around 1580 B.C.E., the aborigines of Marble Range, British Columbia, created a unique earth oven for roasting balsam roots, lily bulbs, and nuts under layers of sword fern and salal, a curative plant known for easing fever and swelling. Among the Paiute of the North American plains, communal rabbit drives resulted in large amounts of meat for pit roasting.

American pit cookery adapted brisket and venison to the barbecue pit for simmering over charcoal or a mesquite fire. In the 1600s among the *boucaniers* (French pirates) of the Mississippi River delta, a rough life of thieving and hiding in Louisiana wetlands required ingenuity in cuisine. To conceal their hideouts, they pitcooked fish and the meat of alligators and wild boar in steamy holes heated with fruitwood or hickory. To flavor their dinner, they added fruit and spice.

See also: Amerindian Diet; Barbecue; Grilling; Luau; Manioc; Polynesian Diet and Cuisine.

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Plant Disease and Prevention

More than 50,000 plant diseases pose an ongoing threat to crop quality and food security, especially in countries such as Ethiopia and Sudan that rely on a few staples. Fungi cause 85 percent of loss to agriculture by absorbing nutrients and permeating growth layers with tubular filaments. More than 85 countries battle *Magnaporthe grisea* (leaf blast) to preserve rice, a principal food crop. In Kenya and Uganda, Pucciniales (stem rusts) can overtake stands of wheat, much as wind-borne soybean rust attacks fields in Australia and South America, coffee rust destroys coffee plants in Sri Lanka, and guava rust reduces yields in Brazil and Hawaii.

The range of plant disease creates an ever-changing variety of challenges to agronomy. Disasters emerge from black root rot in Egyptian cotton, damping off on sprouted seeds in Japanese green houses, water-borne *Erwinia carotovora* (soft rot) on onions and potatoes, *Botrytis* (gray mold) in California kiwi groves, canker in butternut trees in Iowa and rapeseed in China, verticillium in New England maple groves and French sunflowers, and nematodes and fusarium wilt, which cause root knot and brown leaves in southeastern American tomato and zucchini plants.

The most serious infestation involves disease in perennial plants, particularly sugarcane smut in South Africa and southwestern Asia and leaf curl in Georgia peaches. The loss of a perennial crop requires the sterilization and replanting of an entire field or orchard. Control of the world's 1 million insects suppresses the spread of brown rot in cherry and plum orchards by flies, fire blight in pear trees by honeybees, and soft rot fungi in blackberries by curculio weevils.

Plant Pathology History

Blight figures in the early agricultural history of Babylonians, Hebrews, and Indians, as recounted in the books of Deuteronomy around 2000 B.C.E., Rig-Veda

(ca. 1200 B.C.E.), and Amos (750 B.C.E.). The writings of Homer in 850 B.C.E. and of Cleidemus, Aristotle, and Theophrastus, the “Father of Botany,” from the fourth century B.C.E. indicated serious concern for crop failures and dependence on sulfur for combating plant disease in figs, grapes, and olives, major export crops in the eastern Mediterranean. In Sicily, Theocritus, a third-century B.C.E. pastoralist, recommended the use of ground olive pits as a rust preventative. Still prevalent in the Roman Empire in 66 and 188 C.E., rust in cereal crops and legumes precipitated periods of hunger. To ensure food supplies for a growing population, government officials courted Egyptian grain exporters.

In Guangdong Province, Hsi Han’s *Nan Fang Tshao Mu Chuang (A Prospect of Plants and Trees of the Southern Regions, 304)*, China’s earliest botanic encyclopedia, suggested disease prevention methods for banana and banyan trees, melons, and millet, including the placement of bags of ants in citrus trees to attack pathogens. Asian farmers perfected systems of companion planting, such as planting nitrogen-fixing mosquito ferns in rice paddies to control disease and increase harvests.

Native Americans planted corn near wild grasses that shed disease-resistant pollens. Growers spaced beans around corn hills to fix nitrogen in the soil and enhance the strength of corn stalks. Growing squash around these vegetables protected the root systems from sunlight and prevented wilt. The interaction of beans, corn, and squash against pathogens created an agricultural triad known as the “three sisters.”

Scientific observations raised questions about infection, such as the concern of Connecticut growers in the early 1700s that wheat rust seemed worse near barberry bushes. In 1729, Italian botanist Pier Antonio Micheli identified 900 fungi and reported on their effects on melons. Specific chemical deterrents to disease evolved from the research of plant specialists, notably French mycologist Matthieu du Tillet, who, in 1755, discovered the efficacy of copper sulfate in destroying wheat smut. In 1808, Karl Asmund Rudolphi, a Swedish botanist, identified the nematodes that caused cysts in beets, corn, potatoes, soybeans, and tomatoes. The fight against root fungus received theoretical assistance in 1815 from Swiss botanist Augustin Pyramus de Candolle, who coined the term *Nature’s war* to describe the attack of one organism on another.

In 1841, English plant pathologist Miles Joseph Berkeley summarized the cause

of fungus in cabbage, coffee, hops, onions, pears, and wheat. His overview proved prophetic of the Highlands and Irish Potato Famine of 1845–1852. Fungal spores from guano imported from Peru spread over northwestern Europe, subjecting Belgian, Flemish, Irish, Prussian, and Scots crofters to a devastating plant blight and resultant starvation and declines in population. In 1861, German microbiologist Anton de Bary, the “Father of Plant Pathology,” advanced theories of plant susceptibility to disease, which he applied to potato blight and wheat rust.

Aggressive pathogens erupted in the mid-to late 1800s, when coffee rust destroyed Ceylon’s plantations, which growers replaced with tea. In Languedoc, France, from 1858 to 1875, downy mildew imported on grape cuttings from North America stripped 40 percent of vineyards of their leaves. French botanist Alexis Millardet’s application of Bordeaux mixture, a blend of copper sulfate and slaked lime, and the grafting of Assyrτικο rootstock imported from the islands of Paros and Santorini rescued French vintners following a total loss of 10 billion francs.

In 1888, California citrus growers overcame scale after Charles Valentine Riley, the grasshopper specialist for the U.S. Entomological Commission, imported vedalia beetles from New Zealand as a green pesticide. In 1898, Dutch microbiologist Martinus Beijerinck tackled the causes of destruction of squash and walnuts. He theorized that mosaic and ring spot developed from a virus, a microbe smaller than bacteria. His work explained the role of unsanitary tools in the spread of leaf mosaic in apple orchards and Bidens mottle virus, which distorted the leaves of endive, lettuce, and peppers.

By the end of the nineteenth century, college curricula featured plant pathology as a preparation for careers in agronomy, a crucial profession to developing nations. Widespread crop failure assailed populations at a time when food security was tenuous. In Cameroon, South Africa, and Zimbabwe in 1903, an ergot fungus, *Claviceps africana*, infected sorghum and decimated the seed yield. A three-year famine resulted after beetles, flies, and wasps fed on the sweet secretion and spread the fungus to healthy fields.

In the United States, the Smith-Lever Act of 1914 set up the Cooperative Extension Service of the Department of Agriculture to educate farmers in plant pest identification, prevention, and eradication. Field agents introduced pesticides to communities and taught appropriate dilution rates. Passage of the Food and

Environment Protection Act of 1985 enforced the correct storage and application of disease suppressants for the stated purpose, such as shielding preemergent crops. Trade restrictions on imported crops prevented exotic pathogens such as fire blight in pome fruit and potato wart from spreading to virgin soil.

Pesticides

Low-toxicity organic pesticides shield plants from invasive microbes. For example, jojoba oil and cow's milk both control mildew on grapes, and cinnamaldehyde from cinnamon bark and eugenol from cloves both kill wood decay in apple orchards and banana and mango trees. In the 1920s, Sydney research chemist Arthur de Ramon Penfold promoted the use of tea tree oil (*Melaleuca alternifolia*), a native Australian biocide found effective on microbial biofilm, the slime communities that invade grapes, peppers, and tomatoes.

Neem oil (*Azadirachta indica*), a biodegradable deterrent pressed from the fruit and seeds of a common evergreen in India, kills the eggs of ants, beet armyworms, cabbage worms, and mushroom flies. The oil also destroys tuber-eating nematodes that distort the roots of carrots and form cysts in cactus, potatoes, and soybeans. Farmers value neem oil spray for suppressing apple and citrus canker, powdery mildew on cucumbers and grapes, and rust on wheat.

Pesticide production burgeoned in the 1940s with the development of fungicides and, a decade later, with nematicides. However, advances did not aid individual growers fast enough to spare Bengal a blight of brown spot on rice in 1942, prevent crown rust in Victoria oats on the North American plains in 1945, or stop wheat rust in Madhya, India, in 1946–1947. The 1960s brought Japanese chemist Yoshiharu Doi's identification of mycoplasmas, a plantcrippler that leafhoppers spread in cotton, rice, and sugarcane. Scientists contributed fertilizers to halt stunting, edema (corky scab), and dwarfism from polluted air and soil, waterlogging, and weather stress from temperature extremes and wind.

More toxic pesticides required special handling to prevent human ingestion in toxic amounts. One example, diazinon, which Ciba-Geigy first marketed for home gardens in 1952, came under increased surveillance until the U.S. Department of Agriculture outlawed its sale in 2004. In 1962, American biologist

Rachel Carson's *Silent Spring* blamed dichlorodiphenyltrichloroethane (DDT) for killing birds, a main line of defense against insect vectors of disease. Another pesticide, vinclozolin, a general fungicide that BASF formulated in 1981, raised so many questions about cancer generation that, in 2004, the company restricted application of vinclozolin to *Brassica napus*, the source of canola oil. In 2011, the Endocrine Society pressed for more study of the fungicide's effects on the human hormone system.

Disease Prevention

Historically, natural pest control has succeeded worldwide, such as the plowing of eggshells and human hair into soil to increase plant sustainability. Organic chemicals— Bordeaux mixture, copper, fungicidal soap—destroy pests. Weather forecasting and satellite monitoring warn planters of unfavorable conditions, particularly too heavy or too light rainfall to grow oats or winter wheat. Such natural predators as wasps consume the whiteflies that spread sooty mold.

Soil preparation encourages healthy crops, such as plowing diatomaceous earth in vegetable fields to forestall nematodes and the inoculation of beet, corn, cotton, potato, soybean, tomato, and wheat seeds with chitosan, a product extracted from shrimp shells, to boost plant immunity to fungi. Aeration and drainage prevent soggy fields, which perpetuate club root.

As ecologists whittled down the number of pesticides safe for food crops, from the 1990s, they formulated more natural methods of warding off disease via molecular breeding of certified disease-resistant cultivars and plantings of Indian mustard to thwart nematodes. Growers developed regimens of buying pure seed, applying systemic paldoxins (fungicides) to rows, rotating crops to deprive pathogens of hosts, sterilizing tools, spraying sooty mold with detergent or chamomile tea, and quarantining infected plantings. The application of compost and organic manure controls antagonistic pathogens; the injection of steam into soil sterilizes it by killing microbes. Paired plantings promote natural protection, for example, chives and garlic among leaf vegetables, horse radish with potatoes, sage with cabbage, and marigolds to prevent root knot in cereal crops, eggplant, and lettuce.

A dusting of sulfur reduces botrytis in strawberries and scab on apricots and melons; iron sulfate saves Hawaiian pineapples from chlorosis (yellowing). In southern California vineyards, sulfites halt Pierce's disease caused by *Xylella* bacteria. Underground and drip-line irrigation systems prevent watering from enhancing humid conditions that feed fungi. An end-of-harvest removal and burning of plant gall and insect casings circumvent the life cycle of beetle stem invaders and flying leafhoppers that spread such fungi as ergot on rye and chlorosis in the coconut palms of Florida, Jamaica, Mexico, Tanzania, and Texas.

See also: Agriculture; Famine; Hanna, Gordie C.; Monoculture.

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[Pliny the Elder \(23-79 C.E.\)](#)

Imperial Rome's prize encyclopedist, Caius Plinius Secundus (Pliny the Elder), included cookery, curatives, and pure food in his scientific research.

A native of Como, in northern Italy, Pliny enjoyed the privilege of equestrian rank, which afforded him a broad education in history, law, literature, and the sciences. During the reign of the Emperor Vespasian (69–79 C.E.), Pliny achieved promotions to infantry commander, cavalry and naval prefect, and procurator of Africa, Belgica, and southeastern Gaul. While indulging his intellectual curiosity, he compiled the 37-book *Historia Naturae* (*Natural History*, ca. 77 C.E.), a life's work. He mentored his sister Plinia's son, Pliny the Younger, and tried to shelter

the boy and his mother during the eruption of Vesuvius on August 25, 79 C.E. Answering a call to aid friends attempting to escape by galleys at Stabiae, Pliny began overseeing their boarding. Because of asthma and obesity, he died suddenly on the beach of respiratory failure, leaving unedited the last 27 books of his nature compendium.

The breadth of knowledge in Pliny's writings suggests a man devoted to basic facts as well as curiosities gleaned from 2,000 books in Greek and Latin by 400 authorities. Pliny covered oddities—the eating of vipers in India—as well as agricultural myth—the goddess Ceres's teachings on grinding grain for bread making. His interest in health encompassed superstitions and practical medicine, for example, causes of kidney stones and the morning sickness of parturient women. He wrote on ordinary commodities, namely, balsam, cinnamon, ginger, honey, myrrh, pepper, shallots, and sugar and perused agrarian pursuits, such as fish and oyster farming and shipping.

Polymath

Pliny's in-depth reading preceded a warehousing of information. In books 18–28, his encyclopedia surveyed agriculture, naming grains, herbs, and vegetable crops and describing in detail the technology of Roman watermills that ground barley and wheat. On common cures, Pliny cited a recipe for stewed frog, a folk treatment for cough and ophthalmia. Comments on cuisine lauded pork shoulder above all meats for flavor and praised a Roman delicacy, goose liver soaked in honey and milk. Other poultry uses specified roasted webbed feet, cockscombs for stew, and the recycling of goose down for pillows.

In his study of cuisine, Pliny maintained objectivity, even toward the intrusive perversions of Parthian cookery on Roman foodways. As an empiricist, he rejected the analysis of dreams after a heavy meal as spurious but recognized that foods could cause disease. He extolled unborn and infant rabbits as delicacies and thanked nature for making the animals so prolific. Of the luxuries that threatened Roman values, he demeaned “Armenian plums” (apricots) as rich men's food and specified chervil as an aphrodisiac and stork as an unrivaled entrée. His egalitarian principles, a holdover from Republican Rome, required that servers

present all diners the same fare.

Pliny excelled at minutiae. He identified the first farmers to fatten peacocks, pullets, and thrushes for the table. His advice on foodstuffs explained why crayfish should be boiled alive and why wise cooks limited the presentation of oysters to the nine months between August and April. Of fish for the table, he identified 1,000 species. He recommended mullet, rockfish, scarus, sturgeon, and wolffish and singled out the anchovy that cookbook compiler Apicius pickled in *garum* (fish sauce) as Rome's most expensive condiment. Because of the centrality of fish in the Roman kitchen, Pliny complained of the price of fine seafood, which could cost as much as an enslaved cook.

Food Preferences

Pliny's practicality informed Roman cooks on the best viands for the menu. His text specified almonds from Thasos, Belgian geese, damsons from Damascus, green carobs, parsley stalks and seeds, and powdered bees. From his own experience, Pliny recommended berries for breath sweetening. His evaluation of food and emotion typified lentils as a moderator of temper. He suggested methods of keeping hearth fires lit and the capping of a pestle with iron to ease the work of crushing and pounding. His recipes described rocket (arugula) pureed in honey and water and a dish of asphodel bulbs ground in a mortar with figs, oil, and salt. For the tastiest asparagus, he advised growing spears in heavily manured soil; for the strongest onions, he chose red varieties from Africa over white bulbs from Gaul. Beans he rejected entirely for their smell and for causing gut distention and flatulence.

Despite his scientific bent, chauvinism permeated Pliny's writings, which maintained the superiority of Italy for food production and offshore fishing. Pliny admired the mild, sunny climate and well-watered pastures for generating the sweetest endive, Calabrian grapes, leeks, and olives. He bought only Tarantine salt and specified the Piedmont for producing *secale* (rye), a famine food and eventual supplanter of spelt. He valued cow's milk for cheese more than for butter, a barbarian food, and fish heads over the rest of piscine meat. Orchardists followed his advice on picking apples on dry days, avoiding windfalls, and

storing unbruised fruit in a cool, dry bin. To raise the best figs, he proposed growing domestic stock alongside wild fig bushes, an early method of hybridizing fruit.

Some of Pliny's entries contain necessary alerts. His instructions for vineyards outlined meticulous details of planting and pruning, which ensured quality vintage in Opimian wine. Of *perpotatio* (wine parties), Pliny warned of licentious behavior caused by drunkenness, especially where married women dined alongside their husbands in full view of lustful rivals. He valued all types of parsnips and turnip greens and described the tinting of plain white turnips with harmless purple food dye and five other colors. In one of the first consumer reports from the ancient world, he warned that unscrupulous dealers adulterated other foods—balsam and myrrh with gum, bread with chalk, livestock fodder with weeds, olive oil and wine with unwholesome additives, and pepper with juniper berries. For these infractions of buyer trust, the polluters risked banishment or enslavement in the mines.

See also: Adulterated Food; Apicius; Poisonous Foods; Roman Diet and Cuisine, Ancient; Shellfish.

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Poisonous Foods

The sampling of unknown mushrooms, nuts, plants, and toxic fish and meat caused the world's first food poisoning. Seemingly harmless substances, such as almonds, castor beans, and elderberries, can produce skin rash, burning or swelling tongue and lips, stomach and intestinal upset, gasping, seizure, and

sudden death. An unusual conveyance of toxins, red tide, an algae bloom producing a neurotoxin, can contaminate oysters and generate a gaseous irritant especially harmful to people with asthma. More dramatic suffering occurs when people consume quail that feed on hemlock seeds, which cause creeping paralysis that stops the heart.

Nicander of Colophon, an Ionian botanist and priest of Apollo, became the first scientist to issue a list of death-dealing substances. The focus of *Alexipharmaca* (*Antidotes*, ca. 140 B.C.E.), which Nicander based on the research of third-century B.C.E. toxicologist Apollodorus of Alexandria, warned of the effects of henbane and thorn apple (*datura*). More poet than botanist, Nicander laced his verse claxon with victims of hemlock poisoning crawling the streets, gagging, arteries contracting, and eyes rolling. He sensationalized how the eating of a greenish toad caused heartburn and terminal hiccups that convulsed the victim to death.

Dangerous Dining

In the Western Hemisphere, examples of noxious foods come from substances as common as agave, dal, kidney beans, peach seeds, pokeweed greens, potato peelings, and raw carp. Manioc, a source of hydrogen cyanide, requires grating and soaking to leach out toxic cyanides; similarly, acorns need a lengthy rinsing to remove bitter tannin before Korean cooks can extract acorn starch for cakes and noodles.

Slower poisonings result from vitamin B1 depletion from nardoo root (*Marsilea drummondii*), an Australian water fern, and from the nitrosamines in smoked foods and mercury in fish, both potentially lethal to humans. Another slow-acting toxin derives from water passed through lead plumbing and from acid foods cooked in vessels soldered with lead. The deaths of 163 Nigerians in early summer 2010 resulted from lead-laced water in the gold-mining region of Zamfara.

In the Caribbean, consumption of reef fish contaminated with ciguatera produces hallucination and a shambling gait. Servings of ackee fruit (*Blighia sapida*) require judgment about ripeness: underripe or overripe fruit can kill from the effects of alkaloids. Similarly, botulism from *Clostridium botulinum*, a

bacterial toxin found in honey and contaminated canned goods, paralyzes the face and respiratory system.

Another lethal comestible, toxic mushrooms may look as harmless as edible varieties—for instance, the deadly amanita and the harmless puffball. Folklore classifies the killer mushroom as a “toadstool,” a Middle English rural belief that toads secrete poison. The Roman Empress Agrippina reputedly murdered the Emperor Claudius in 54 C.E. by feeding him the edible *Amanita caesarea* blended with *Amanita phalloides* (death cap mushrooms). Another victim, Holy Roman Emperor Charles VI died in Vienna after eating amanitas on October 20, 1740.

In Asia and the Pacific, the availability of poisonous nettles and nuts endangered Allied soldiers during World War II. The U.S. War Department issued an illustrated guide to foraging, *Emergency Food Plants and Poisonous Plants of the Islands of the Pacific* (1943). The text advised watching monkeys and eating the native fruits that the primates ate.

Food fads intrigue the adventurous to risk the processing of poisonous food for hazardous cuisine, including the angelfish, basket shell snail, blue-ringed octopus, floral egg crab, and purple fluorescent frog. In Japan, consumption of parts of the fugu (a poisonous type of puffer fish or blowfish) bearing tetrodotoxin can kill instantly. In one instance, fugu livers killed kabuki actor Bando Mitsugoro in Kyoto in 1975. To prevent diner collapse, officials require licensing of chefs who fry or grill fugu or use it in hot pots and sashimi. By law, the imperial chef may not serve fugu to the Japanese emperor.

Deadly Fungus

A fungal contaminant of grain, ergot has a lengthy history, as demonstrated by tablets from the Fertile Crescent and in the writings of ancient Greek physicians Galen and Hippocrates, the ancient Greek and Roman scientists Theophrastus and Pliny, and tenth-century Persian healer Muwaffak. The poison, lysergic acid, convulses the limbs and causes them to rot. Spread by insects seeking the honey drops from infected grains, the growth of ergot fungus caused Romans to remove diseased grains from the threshing floor to circumvent the poisonous bread that had weakened Caesar’s troops at the Siege of Marseilles from March to

September 49 B.C.E.

In 943 C.E., the growth of sweet, black *Claviceps purpurea* fungus on rye killed 40,000 people in Limoges, France. The malady, later dubbed *ignis sacer* or Saint Anthony's Fire, spread over Germany and Spain, causing hallucinations and mad outbursts as well as gangrene. The epidemic remained puzzling until 1557, when German herbalist Adam Lonicer of Marburg informed people about the dangers of ergot-contaminated rye bread and flour. The fungus remained virulent in the twenty-first century, when it infested barley in Addis Ababa Ethiopia, in summer 2001.

Food Testing and Tasting

Because of the fear of harmful food, royalty and dignitaries under threat have traditionally employed animal and human tasters, a role graphically illustrated in the film *Cleopatra* (1963) and the television series *Rome* (2005-2007). As a precaution against assassination attempts, the taster sampled servings of the dishes or dipped bread into their juices to determine wholesomeness. Upon confirming meal safety, the taster covered the dishes, which the pantler and pages carried to the dining table.

Food-tasting protocol derives from centuries-old regimens. For wines, in the Middle Ages, the royal diner kept a slice of supposed unicorn horn (actually from a narwhal) attached to a cup for testing beverages and pieces of table bread. The valet carried water used for hand washing to the porter's buffet to pour it over the horn and watch for any change of color, indicating poison. The unicorn horn, they maintained, was the only sure means of assaying the quality of each serving. The hall usher tested the royal napkin in front of the pantry porter by kissing it to prove it pure and safe. In India, rulers relied on citron, a citrus fruit deemed effective as an antidote to all poisonous food.

See also: Adulterated Food; Coprolites; Manioc; Wild Food.

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[Polo, Marco \(ca. 1254-1324\)](#)

In *The Travels of Marco Polo* (ca. 1300), a pro-Christian memoir rich with cultural and historical details, Venetian merchant and explorer Marco Polo provided details of life—and food—in the Middle East, central Asia, China, Indonesia, the Indian subcontinent, and Byzantium.

Marco Polo came of age in a vast trading hub on the Adriatic Sea, where ware houses stocked clove, ginger, nutmeg, pepper, and saffron. At age 15, he fell under the spell of journey stories of his father, Niccolò Polo, and Niccolò's brother Maffeo Polo, traders in luxury goods who had visited Constantinople and the Mongol Empire. They had met Kublai Khan, the first Yuan emperor and grandson of Genghis Khan, the universal ruler of Tartars (Mongols). In fall 1271, the Polo trio—father, son, and uncle—set sail for Acre, Israel, on a 24-year journey to Asia covering 24,000 miles (38,600 kilometers). By camel train, they proceeded to Hormuz, on the Arabian Sea, but found no dependable ship bound for Cathay (China), the world's largest empire.

Traveling the Silk Road, which Maffeo and Niccolò knew from past journeys, the Venetians spent 42 months on the land route to East Asia. They witnessed unusual cuisine, such as the all-meat diet of Turkish cattlemen. From Armenia into Iran, the merchants observed brisk trade in fruit and vegetables and Persian tableware made of ceramics and metals. At inns, they entered paved courtyards

fragrant with stew simmering over fires. The focus on herding horses and sheep in the grasslands of Afghanistan presented table fare rich in koumiss (mare's or camel's milk) and a range of meats, including the flesh of rabbits, which Afghans captured via falconry. In the Taklimakan Desert, by contrast to lush mountain passes, the Polos found no rest stops or food in the wild until they reached the Badakhshan Mountains in northeastern Afghanistan.

For provisions, they packed a month's supply for themselves and their mounts. At various points, the greenish water tasted either bitter or brackish. Marco Polo fell ill from the unpalatable fare and rested for a year in the mountains before setting out once more over the Oxus River into the Pamir Mountains of Tajikistan. During a 12-day march at an altitude of 20,000 feet (6,100 meters), because of the thin atmosphere, the men failed to kindle fires to cook their meals.

The Khan's China

Accommodations and dining for the trio improved in 1275. The approach to the winter palace in Dadu (Beijing) offered travel stops and inns as well as street snacks at stalls and hot shops. The local diet favored millet and included herbal medicines, turmeric, and sake, a powerful alcoholic drink fermented like beer from rice. A mingling of world cuisines appeared in stocks of cinnamon bark, rhubarb, and tea. At Shandu (Xanadu) in Inner Mongolia, the location of the bamboo and marble summer palaces of 60-year-old Kublai Khan, Marco Polo presented letters of introduction from Pope Gregory X and a gift of sacred oil from Christ's holy sepulcher in Jerusalem. The khan was so pleased that he hosted festivals and banquets to honor his Venetian guests.

In the new Mongolian city of Khanbaliq, begun in 1272, the khan's winter court staggered the Polos with its adornments of hall and chambers. The population within the palace walls rose so high that the royal kitchen served more than 6,000 at each meal. Among serving pieces, chefs featured multistage platters for coordinating entrées with sauces and toppings. Wait staff used gold ladles to transfer entrées from lacquer bowls to plates. The khan himself supped on the milk of albino herds. To shield the khan's servings from the exhalations of servants' mouths and nostrils and from the odor of their bodies, servers wrapped

their lower faces in silk veils and knelt on the floor.

Mongolian Cuisine

Marco Polo cited popular recipes of nomadic Mongolian hunter-gatherers. Lacking chickens, pigs, and fresh vegetables, they relied heavily on dairy products of ewes and mares. He described fermented milk as an unassuming drink that left him feeling fully nourished. In the field, Mongol warriors ate their rations raw or cooked in earthen pots heated over fires of cow or horse dung. In lieu of cookware, they emptied the belly of their kill and boiled meat inside in water over the fire. When the dinner was ready, Mongols ate the meat, broth, and animal stomach container. In summer, they varied their meat diet with apples, cherries, hazelnuts, juniper berries, leeks, and onions.

Directions for curative and strengthening foods from the era tied the “Five Flavors” to the “Five Viscera.” By balancing nutrition, individuals could promote *qi* (body energy) and ward off illness or organic distress in specific areas of the body and spirit:

Food	Protected Area
barley soup	spleen, stomach, and intestines
bear soup	feet and joints
bottle gourd and mutton soup	bladder, kidneys, and pancreas
dog meat	vascular system
horse heart	spirit
horse meat	bones and stamina
horse stomach and intestines	general well-being
sheep’s heart with saffron	heart and spirit
wild camel meat	skin

[Recipe: Mongolian Cauldron Stew](#)

In a large kettle, combine mutton (originally wild Bactrian camel hump)

with sheep's fat, haunches, lungs, stomach, tail, or tongue. Season with goose fat. For flavoring, boil the mix with black pepper, cardamom or cinnamon, fenugreek seed, saffron, and turmeric. Serve the stew with bottle gourd, cheese, or chickpeas.

On a hard gallop that made meals difficult, Tartar riders sucked blood from nicks in the veins of their mounts. They reduced mare's milk to a paste first boiled, then dried in the sun. Indoors, cooks favored noodles or macaroni combined with eggs, mushrooms, mutton, sheep intestines, and sprouted ginger. They served the mix in clear broth flavored with pepper, salt, and vinegar. For Russian olive soup, a chopped leg of mutton or sliced sheep torso acquired subtle flavoring from cardamom, Chinese cabbage or nettles, and Russian olives. Another meal, butter skin *yuqba*, began with minced mutton and sheep's tail and tallow. The addition of mandarin orange peel, sprouted ginger, salt, and spices preceded the coating of skin in rice and wheat flour and vegetable oil. Marco Polo also admired the black meat of Fujian poultry, the variety of fruit and vegetables, and the availability of preserves and sugar, which sweetened cups of tea.

More Journeys and Observations

As a court guest under semiofficial house arrest, Marco Polo accepted inspection embassies to Yunnan, Sichuan, Fujien, Tibet, and Pagan and, in 1282, as far south as Burma. The provincials of Yunnan ate dogs and "brute beasts and animals of every kind," which the Venetian rejected as disgusting. He observed the wealth in salt mining and the transport of salt cakes and ginger along the Yalu and Yangtze rivers. In place of metal coins, diners spent whole salt disks and used broken pieces to flavor their food. At Mien, he marveled at the assortment of great beasts—elephants, oxen, and deer. Because of his proficiency in four languages—probably Chinese, Mongolian, Persian, and Uighur—Marco Polo crossed borders with a gold passport and served the khan well as a legate. He governed Yangchou for three years but predicted that the Mongol rule—and the welcome to Venetians—would weaken. In winter 1291–1292, after 17 years at the khan's court, the three Polos departed China's southeastern coast at Zaitun to join Princess Kokijin and

her Persian wedding party of 600 bound by a 14-junk flotilla to Hormuz.

At Kinsai (Hangzhou), the Polos enjoyed the luxuries of a splendid commercial center selling jewels, pearls, and spices. During a two-year voyage from Quanzhou in Southeast Asia to Sumatra, Marco Polo continued recording unusual animals, particularly unicorns, and indulging his obsession with Asian cuisine. In Java and Nicobar, he became one of the first Europeans to recognize and describe the “Pharaoh’s nut” (coconut), which he helped to popularize into a fad as a basis for sweets and beverages. On observation of table customs, he stated that Javanese diners ate five times the rations consumed by Venetians. He commented on the importance of sago at Fansur in northern Sumatra for the making of lasagna and provisioned his entourage with enough sago flour to take some home to Venice. On the way through Ceylon and Malabar, India, he spoke of the centrality of tamarind as a medical purgative and pantry staple, which he introduced to Europeans.

Marco Polo’s musings on local custom included the importance of proprieties to daily affairs and religious ritual. He commented, for example, on the different valuation of right and left hands. Because Buddhists and Hindus reserved the left hand for wiping and cleansing the ears, nostrils, and anus, they observed a taboo requiring that only the right hand touch table implements and food. Buddhist festivals at Malabar required strict preparation of meat dishes for idols. The women who served waited a suitable length of time for the god to eat, then removed the uneaten portions and treated themselves to the divine repast. At Lar (Gujarat), where farmers excelled at raising ginger and pepper, he counted 20,000 dancing girls singing and offering flowers and food to Buddha. In reference to human longevity and wellness, he lauded yogis for abstinence from impure food and for cooking and eating only wholesome meals of bland semolina or bran, rice, milk, and water. Their self-discipline included several annual fasts, a regimen that Marco Polo characterized as the world’s hardest lifestyle.

From the Arabian Sea, the trio reached Aden, where the diet for horses centered on dried fish and for people on jujubes. The Polos sped overland from the Persian Gulf to Iran, to Trebizond on the Black Sea, and through the Bosphorus to Constantinople (Istanbul). An intercontinental crossroads, ruled by Mamluks, the city prospered from the sale of enamelware, incense, leather, and spices from India. The final sea leg of the journey returned the three travelers to tasteless

meals aboard ship, where the dark mess area stank of rotting food and toilet waste, worsened by bouts of human seasickness. Ship's cooks contended with invasions of cockroaches, lice, and rats.

Arriving home in 1295 during the second Venetian war with Genoa, Marco Polo was seized on board a galley and lodged in a cell as a political prisoner. He spent four years dictating his travelogue to a fellow prisoner, romance writer Rustichello da Pisa, under the title *Il Milione* (*The Million*, ca. 1300). Marco Polo's fanciful memoirs became one of the most popular works of the late Middle Ages. After marriage and a career in merchandising, he died around age 70 on January 9, 1324. His adventures generated great interest in the East Asian diet and spurred Christopher Columbus to route his vessels by sea west to the Spice Islands.

See also: Medieval Diet and Cuisine; Pasta; Poultry; Silk Road.

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[Polynesian Diet and Cuisine](#)

Lacking cereals and domesticated animals, the traditional Polynesian diet is a testimonial to tropical whole foods served succulent and sweet. Tikopia islanders became so attuned to food sources that they determined time spans by the ripening of tropical fruits and vegetation and by eel and fish runs. Tahitians used

food gifts to keep ancestors close to the living. Solomon Islanders lengthened the shelf life of perishable breadfruit by fermenting them in pits and roasting or steaming them in *umus* (earth ovens). Balls of breadfruit paste sustained natives through September and October, the stormy season. For trade with passing ships, they reserved the meat of dolphins, pigs, sharks, and turtles.

For hunter-gatherers at Tongareva, lagoons offered the safest and most reliable source of fish and shade palms as well as algae, lichen, moss, and seaweed. A stronger agrarian tradition of dry and irrigated crops and tree fruit fed the people of Anuta, Easter, Marquesas, and Pitcairn islands, where marine resources were scarce. By the arrival of the sweet potato from South America to Hawaii and Rapa Nui, around 1000 C.E., the addition of a pantry staple and trade item eased the strain of protecting wild plants from the whims of Pacific weather.

On the 12,000 islands that dotted a stretch of 9,000 miles (14,500 kilometers) across the Pacific, Melanesians, Micronesians, and Polynesians participated in a gendered food collection. Men loaded coconut clusters and plantain bunches on notched sticks, while women gathered shrimp and kava root into frond baskets and pandanus bags. Fish species varied with the availability of fresh water streams, which numbered 15 on Tahiti and 111 in New Guinea. For famine food, villages relied on almonds, fern, Malay apples, sago, and kudzu or turmeric root which also served as a common dyestuff.

Carbohydrate-Rich Diet

Dominating Oceania's cuisine, starchy vegetables such as the Maori fern root required pounding by stone pestle. The earliest meals developed variety by incorporating fruit bats, iguanas, and seabirds along with grouper, jacks, parrotfish, tangs, and turtles. Wrapped in pandanus or ti bundles, macerated bulbs and tubers shared space in earth ovens with roasted ahi and swordfish, steamed mollusks and octopi, and coconut puddings contained in coconut shells.

Families bred birds, the flightless nene in Hawaii and the moa in New Zealand, both of which eventually became extinct from overconsumption. Bamboo splits served as cutting tools and tubes for cooking vegetables over hot coals alongside spitted dogs. The first kitchen tools cracked bones, peeled breadfruit, and grated

tubers. Cooks strained liquids through bark cloth. More specialized equipment hooked or trapped fish in stone weirs, netted pigeons, or snared doves to eat with breadfruit and taro.



A nutritious, high-fiber starch of the Polynesian islands, *poi* is prepared by pounding cooked taro corms (roots) and mixing the paste with water until it reaches a thick, smooth consistency. Hawaiians and other Polynesian natives considered the dish sacred. (*Sean Thompson/ Associated Press*)

From prehistory, Hawaiian food developed into a fusion cuisine enriched by foods from Africa, Asia, Australia, Europe, and the Americas. Marquesans added breadfruit to the typical menu; Tahitians contributed baked bananas and coconuts. On Tonga, from around 1000 B.C.E., cooks used spears for fishing and pottery jars for boiling the meat in herbed water. For ritual sea voyages by double-hulled canoe or outrigger back to Tahiti, mariners ate fresh supplies—bananas, candle-nuts, coconut, and sugarcane—and netted or trolled for fresh tuna and snapper before relying on “canoe foods,” dried coconut pulp or

fermented breadfruit.

Celebratory dishes displayed the island chefs' imaginative use of local meats and produce. The Polynesian mythographer David Kalakaua, Hawaii's king from 1874 to 1891, compiled *The Legends and Myths of Hawaii: The Fables and Folklore of a Strange People* (1888), which included pagan foodways. He preserved such events as the five-day luau, a mythic feast of the bride Lono and the Tahitian chief Laa's marriage and feast. The nuptials for three couples concluded with an evening feast for 1,000 guests. Food service accompanied hula exhibitions and *mele-inoas* (postwedding songs). Indulgence in kava (*Piper methysticum*) reduced many guests to days of recuperation.

By 1600 C.E., Polynesians inhabited Pacific lands from Easter Island and Hawaii to New Zealand. After the arrival of Captain James Cook in 1778, the Hawaiian diet included goats, melons, onions, pumpkins, and wild boar, the focus of the luau. In the 1800s, cattle ranching shifted entrées once more toward beef and broiled beef jerky. Most of the warmer islands developed kava into the national narcotic drink, which Christian missionaries began eradicating after 1822. Undeterred by New England Puritans, Kamehameha III in 1847 hosted 10,000 guests to a feast of oxen and pork, cabbage and onions, and citrus fruit and pineapples.

Specialized Cuisine

Traditional Hawaiian cuisine features *poi*, a nutritious fermented paste of the taro corm that contributes to wellness. Because of its digestibility and fiber content, poi nourishes weak infants and strengthens athletes. The consumption of poi in the 1980s resulted from a popular low-fat regimen, the Wai'anae Diet, a source of energy and stamina. To a bland entrée, Hawaiian chefs add chicken, crab, limpet, and squid and side dishes of arrowroot, bananas, berries, fern, pickled seaweed, sea salt, and yams.

On Samoa, food gifts indicate camaraderie and friendship, a token of affection to a potential bride, or a dowry. Cooks build menus around boiled taro or rice steamed in coconut milk. Chicken and mahimahi come to the table broiled and seasoned with lemon rather than fried in oil. Dishes of breadfruit, crayfish, green

bananas and papayas, seaweed, and taro leaves in coconut cream

Recipe: Tahitian Vanilla Custard

Heat 2 cups of cream with one whole vanilla bean. Remove the bean and whisk in eight egg yolks, 1 cup of sugar, and one pinch of salt. Cool and add 1 quart of coconut cream and one egg. Bake at 325 degrees Fahrenheit in a bain-marie for one-half hour. Top with 1 cup of confectioners' sugar and 1 teaspoon of vanilla extract. Broil or brown with a chef's torch until the sugar melts and forms a crust.

accompany the starchy entrée. Because of Samoan lactose intolerance, beverages range from cocoa to lemon grass or orange leaf tea but do not include milk. Snacks consist of pineapple and macadamia nuts.

Tahitian finger food resembles Samoan dishes. Like Hawaiians, Tahitians in the eighteenth and nineteenth centuries eagerly imported provisions from passing ships. From French mariners, they gained cabbage and chervil; from Chile and Peru, potatoes and white beans. To recipes for steamed rice, goat meat, and yams, cooks added mangoes, oranges, pomelos, tamarind, and guava, a South African fruit that Captain William Bligh introduced when the *Bounty* anchored at Matavai Bay in 1787. For traditional meals, fafa (taro leaves) accompanied *poisson cru*, lagoon and ocean fish marinated raw in lime juice. Native vanilla added fragrance and sweetness to custard and pastry as well as cash from horticultural exports.

Throughout Oceania, the influx of Europeans in the 1800s and of Allied and Japanese troops during World War II forever altered the Polynesian diet through ecological exchange. The introduction of fatty meats, such as Spam and potted ham, upended proportions of carbohydrates to protein and encouraged cardiovascular disease, diabetes, and obesity. To traditional snacks of cycad nuts on Guam, Dyer's figs on Tuvalu, Indian almonds in Papua New Guinea, mangrove fruit on Fiji and Yap, pawpaw on Kiribati in the Gilbert Islands, and Tahitian chestnuts, throughout Melanesia, candy, chips, colas, peanuts, and

processed cheeses have introduced the nutritional anomalies of the industrialized world.

See also: Cook, James; Luau; Paula Marín, Francisco de; Pit Cookery; Seaweed; Shellfish; Taro.

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Pork

A source of meat since 8000 B.C.E., swine are humankind's oldest livestock, predating the cultivation of barley and wheat. Domesticated from the wild boar (*Sus scrofa*) in western China and the Middle East, swine produced meat for farmers in Algeria, Egypt, Greece, Iraq, Palestine, the Sahara, and Turkey. Pork production flourished in China in 4300 B.C.E. and reached a height of sophistication between 2200 and 1100 B.C.E.

Cantonese gourmards paid the highest prices for thin-skinned animals and served roast pig ears with strong black tea. Home cooks preferred cooking ham on the shank for flavoring the stockpot, ribs for barbecue, salt pork for seasoning bok choy or mustard greens, and pig's feet and skin for milk soup. They stir-fried intestines with vegetables, pounded meat for pork buns, and ground fat and

tendons for meatballs. Chinese chefs simmered pork with chicken and duck in wine sauce in a clay crock for a fragrant one-pot meal. For *lap cheong* (sausage), they blended pork liver and ham or sliced bacon with duck liver. A Chinese recipe from 500 B.C.E. lists dates as the appropriate stuffing for suckling pig, which cooks swathed in straw and roasted in a pit.

Europe

Swineherding passed to Europe in 4000 B.C.E. Forest dwellers diversified their diet of birds, fish, small game, and venison by adding pork, a savory seasoning for boiled turnips and greens. Communities that ate pork cooked below 145 degrees Fahrenheit (63 degrees Celsius) risked infestation with hookworm, pinworm, roundworm, and tapeworm.

In the late second century B.C.E., Athenaeus, a Greek food writer living in Egypt, equated a pork dinner with the good life. Greek cooks served pork with lentils; Romans placed corned pork on the plate with fava beans. Roman *suarii* (hog butchers) and Gallic swine farmers dry-rubbed raw pork with aromatic condiments and salt and flavored their products with garlic, herbs, and onions. Apicius, a Roman gourmand from the first century C.E., wrote instructions for skewering a sow's udder and for stuffing a piglet with birds, dates, sausage, and snails.

The pig enriched farmers by farrowing three times a year at the rate of 10 to 12 piglets per litter. The anonymous *Le Ménagier de Paris* (*The Goodman of Paris*, 1393) declared that the city's pork butchers sold 30,794 pigs annually. Fed on acorns, apples, beechnuts, berries, chestnuts, hazelnuts, hawthorns, and rodents, pigs assisted farmers by locating truffles and unearthing grubs and roots, thus aerating soil. Iberian pork, called *jamón ibérico*, gained fame for delicacy and flavor generated by feral pigs feeding in oak forests.

Because pigs thrived in small pens and ate most animal and vegetable refuse, they surpassed cattle in food economy and popularity, especially in Asia. Families kept sties as an assurance of food in the event of crop failures and as symbols of house hold well-being. Slaughter of a young pig produced up to 240 pounds (110 kilograms) of meat for curing into bacon and ham.

The pig sticker, a traveling specialist, organized communities for the rapid conversion of carcasses to bristle for brushes, fat for lard, and meat for varied purposes. Meat preservation consisted of air-drying, brining, salting, smoking, or sugaring chins or a combination of methods, such as the curing and casing of Scotch ham, the smoking of dry-rubbed Westphalian ham over a beech or juniper fire, and the air-drying, salting, and seasoning of Italian prosciutto. Cooks esteemed the delicate flavor of organ meats, particularly kidneys, liver, and sweetbreads, a common name for the pancreas and thyroid glands. With a brass wire threaded with linen, preparers turned pig intestines and soaked them in readiness for stuffing with sausage mix, blended with beef, cumin, mushrooms, myrtle leaves, nuts, olives, paprika, peppercorns, sage, or salt, and for brushing the outside with ashes, gelatin, or pepper before drying or smoking.

In the Middle Ages, swineherds occupied the lowest social rung because of the pig's affinity for latrines and swiddens, but pork-houses provided respectable employment for meat cutters, salt dealers, and coopers. Institutions kept pigs to consume the by-products of grain and oil mills. Abbeys, hospitals, and villages slopped hogs with their garbage, sewage, surgical waste, and surplus crops.

In the 1400s, French *charcutiers* (pork cutters) formed guilds governing the preparation and sale of bacon brawn or souse, confit, *galantine*, ham, lard, pâté, ribs, rillettes, salami, sausage, terrine, and trotters. The collection of apples and the slaughtering of hogs in late fall paired the fruit and meat in recipes, including roast pork with applesauce and pork tenderloin with steamed apples in cinnamon and honey. For simpler meals, mustard accompanied ham slices.

After Catholic forces reconquered Iberia from Muslims in 1492, religious zealots used pork consumption as a test of faith to identify Moriscos and Jews of suspicious lineage and faked conversions to Christianity. At the request of Queen Isabella of Castile, eight of the animals accompanied Christopher Columbus in 1493 on his journey to Cuba.

New World

After Spanish explorer Francisco Pizarro brought Panamanian black pigs to Peru in 1532, cooks added frying in lard to their kitchen techniques. Conquistador and

explorer Hernando de Soto imported tusked swine from Extremadura, Spain, to Tampa, Florida, in 1539. Within three years, he propagated a herd of 700 by letting his animals scavenge for clams, corn, frogs, hickory nuts, lizards, pecans, snakes, tubers, and worms. Subsequent New World introductions by Hernán de Cortés to New Mexico in 1600 and to Jamestown, Virginia, by Walter Raleigh in 1607 continued the spread of swine among American livestock.

Within a half century, the proliferation of livestock in colonial New York, Pennsylvania, and Virginia required statutes limiting the free range of pigs. By 1662 in Connecticut, Maine, Massachusetts, and Rhode Island, cured pork sold at 2.5 cents per pound, 66.7 percent higher than cured beef, which cost 1.5 cents per pound. Farmers relied on barrels of pickled pork as trade items for cotton, salt, and sugar from Barbados, Bermuda, and Jamaica. Seagoing provisioners bargained for pork to feed sailors.

Country curing began with the stall feeding of hogs on acorns, corn, fruit, and peanuts. Some curing methods required the hanging of hams for one to seven years, injecting it with brine and saltpeter (potassium nitrate), pickling the meat in molasses or sugar, or soaking of chines in court bouillon and red wine. Home preparers soaked intestines in vinegar and hot brine and incorporated cornmeal into liver mush and blood, brains, and lungs into meat pudding and sausage. Pork remained a dietary staple among Native Americans and on the North American frontier because of its ease of packing and transport. Barrels of salt pork supplied lumber, mining, and rail camps as well as provisioners for wagon trains.

Industrial Meatpacking

Before the American Civil War, Cincinnati, Ohio, became the nation's "Porkopolis" because of the availability of canal and river transport for meat. In 1848, the city butchered 35,000 hogs. Chicago meatpacker Philip Danforth Armour revolutionized the pork business by shipping live hogs to the Union Stock Yard & Transit Company for processing. By 1860, Chicago's abattoirs outpaced Cincinnati's by bleeding, shaving, scraping, scalding, gutting, quartering, and sectioning 250,000 hogs. The operation became ten times busier in December than in July, before pigs began gaining winter weight.

During the Civil War, commercial pork supplied both armies with meat, some of it from wild razorbacks. Northern provisioners used fruitwood for smoking; rebel meat sellers preferred hickory and pecan wood. The Union raids of Southern smoke houses stripped families of their chief source of red meat for cooking with beans and cabbage. The closure of the Mississippi River to barge and ship travel advanced Chicago stockyards over the packing houses in Cincinnati.

After 1883, railcars refrigerated with compressed ammonia brought pork to packing operations in Kansas City, Kansas; Omaha, Nebraska; Peoria, Illinois; St. Joseph, Missouri; and Sioux City, Iowa, for distribution nationwide. In 1919, Chicago continued to reign as pork capital by employing 30,000 meat cutters to process 19 million hogs. Refrigerated trucks began relieving the pork-packing business of its reliance on rail lines.

Bacon, ham, and sausage took prime positions as breakfast foods. Oleomargarine, made from waste pork fat, competed with butter at half the price. Soul food menus featured barbecued spareribs and chitterlings for the table and pork crackling snacks to delight children. Corn growers in the Midwest profited from demands for feedlot supplies, thus linking the Hog Belt with the Corn Belt.

Industrial pork production increased the accessibility of meat in grocery stores. George A. Hormel's company engineered the first canned ham in 1926 by pressing pieces into a form and filling in gaps with gelatin. The Great Depression increased the popularity of the pork frankfurter. In 1937, Hormel added spiced ham to the market as Spam, a ground convenience food made from economy cuts.

Meat handlers prevented the transfer of pathogens to consumers by feeding no raw garbage or wild game to swine and by irradiating meat to sterilize parasites. In the 1990s, a trend toward low-fat meats spurred breeders to produce leaner animals. Efficient husbandry and injections of antibiotics and growth hormones in piglets made the United States competitive with pork producers in Canada and Denmark.

By 2002, developing countries increased their consumption of pork by 66.7 percent from 1970 rates. The United Nations predicted the meat trend would continue to grow because pigs convert grain to meat more efficiently than cattle and poultry. While U.S. pork consumption remained stable at 47 pounds (21

kilograms) per capita between 2002 and 2007, meat distributors experienced a doubling of pork exports.

As of early 2012, 38 percent of meat consumed globally consists of pork and pork products, which are rich in phosphorus, potassium, and thiamin. Just as baked ham anchors the Easter meals of American Christians and pork sausage stars during celebrations of the Chinese Lunar New Year, so pork roast and suckling pig figure in holiday feasts in Austria, Denmark, and New Guinea. Hungarian and Slovakian food festivals feature blood and liver sausage, much as British pubs advertise mince pie and Jamaica hypes jerked pork to islanders and tourists.

See also: Animal Husbandry; Halal; Kosher Food; Szechuan Diet and Cuisine; Taboos, Food.

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Portuguese Diet and Cuisine

Like other European foodways, Portuguese cookery blends native Iberian staples with the robust aromas and savor of spices from the nation's former colonies. Rabbits and wild greens—asparagus, fennel, and sorrel—flourish in the countryside. Such specialties as Madeira bananas, Azores fish stew, Moorish baby clams in tomato sauce, mountain herb cheeses, and Minho yeast corn bread mark the preferences of small areas.

Because of the use of egg white in stucco church construction and the

starching of nuns' habits, throughout the Middle Ages, convents converted thousands of surplus egg yolks into confections. Sisters fashioned intricate egg sweets, custards in pasta that they dusted with cinnamon sugar and drizzled with burnt-sugar syrup or lemon. Income from the sale of erotically named "nuns' sighs" and "maidens' bellies," some in provocative shapes of breasts and navels, funded the convents while providing an outlet for romantic fantasies among the celibate.

Historically, native cooks focused on meat-heavy menus favoring beef and smoked ham as well as shellfish. Side dishes of *caldo verde* (cabbage or kale and potato soup) and earthy "dry soups" enhanced the reputation of Portuguese recipes for hearty goodness. Moorish influence added almond and Algarve fig sweets, lemon beverages, and egg custards. During the Crusades, the Knights Templars occupied Tomar north of Lisbon from 1160 to the 1550s and

[Recipe: Portuguese Gazpacho](#)

Puree eight plum tomatoes, three 2-inch cucumbers, two large bell peppers, and one red onion. Flavor with 1/4 cup each of tarragon vinegar and light olive oil, 2 tablespoons of lemon juice, one minced garlic clove, one chopped sprig each of oregano and parsley, and sea salt and coarsely ground pepper to taste. Stir in 1 cup of seasoned bread crumbs. Add 1 quart of ice and chill overnight. Garnish with thin cucumber slices and tiny shrimp.

contributed to local cuisine the nutty, smoky savor of sheep cheese.

Portuguese ships became the conduit of cultural enrichment. During the religious persecutions of the eleventh and twelfth centuries, roasted pig fattened on chestnuts tested the faith of Sephardic Jews who pretended to convert to Catholicism by eating nonkosher foods. In the 1380s, according to historian Fernao Lopes, Lisbon chefs imported a Castilian specialty, tripe with white beans, a national dish. In his *Cancioneiro* (*Songbook*, 1516), Re naiss ance troubadour Garcia de Resende, an aide to King João II, described the centrality of grand meat

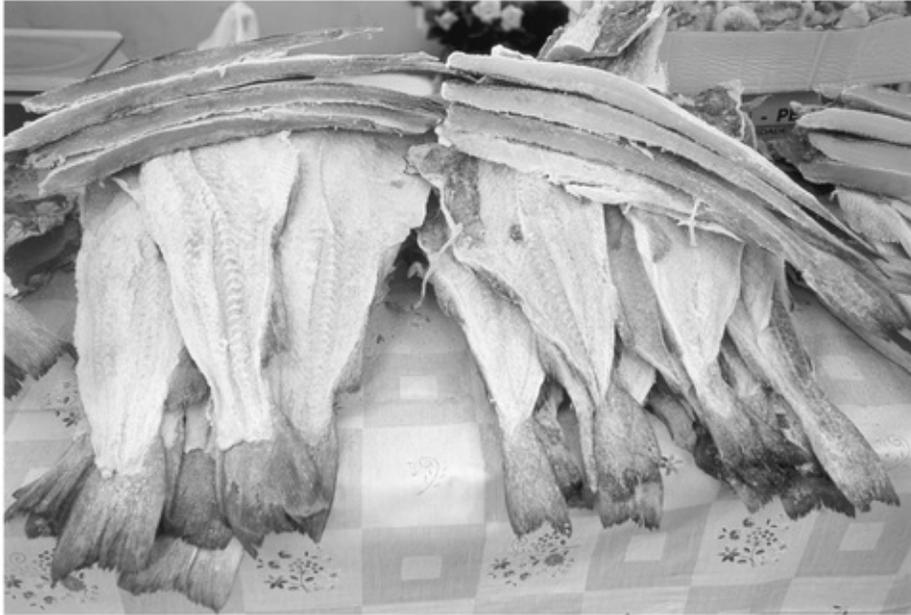
dishes at court. For one example of royal excess, the palace staff roasted an ox and served it encircled with poultry. Provincial one-dish *cozido* incorporated cured pork and beef with cabbage, carrots, and turnips for ladling over rice.

Portugal established its diet in the European age of discovery, which its navigators launched in the early 1400s with the development of the caravel. After 1500, while destroying the food monopolies of the Arabs, Italians, and Turks, Portuguese traders contributed to an era of global species exchange. They made sweet oranges from India the basis of Iberian marmalade, first mentioned in 1521. The importation of coriander, curry, and ginger set native cuisine apart from the rest of Iberia with its bold flavors.

Portuguese travelogue writer Duarte Barbosa, who sailed with navigators Pedro Alvares Cabral and Ferdinand Magellan from 1500 to 1521, observed the value of trading vessels to world culinary exchange. Through the Mozambique Company and the Portuguese East India Company, markets acquired coriander from West Africa, cashews and peanuts from East Africa, and two spices, cinnamon from Ceylon and Indonesian pepper. Extending sea routes introduced mariners to coffee from Brazil and Timor, Japanese sugar, and the tea of Macau.

The Portuguese brought Iberian cookery to its enclaves in Angola; Goa, India; Sierra Leone; and the Caribbe an and to trader ports in Canton, China; Nagasaki, Japan; Sao Paulo, Brazil; and the Strait of Malacca. Elements of the Mediterranean diet—anchovies, cheese, garlic, olives and olive oil, onions, and wine vinegar—contributed to Portuguese dishes based on the Atlantic cod, sardine, and tuna industry. Dramatic entrées featured clams, dried rays, eels, lobster, periwinkles (snails), prawns, sausages, and scallops. Side dishes of fried meat tarts, pickled cauliflower, and candied fruit displayed the Portuguese attention to texture and flavor, even in small servings.

See also: Abreu, António de, and Francisco Serrao; Gama, Vasco da; Indonesian Diet and Cuisine; Mozambique Company; Portuguese East India Company; Trading Vessels.



Bacalhau, dried salted cod, is the unofficial national dish of Portugal. The preparation dates to the time before refrigerators, as a means of preservation. The Portuguese boast that there is a different bacalhau recipe for every day of the year—and more. (Paul Bernhardt/Getty Images)

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[Portuguese East India Company](#)

For five years (1628–1633), the Portuguese East India Company (*Companhia do comércio da Índia*) monopolized commerce in India's food products but foundered against overwhelming economic and political odds.

The chartered forerunner began in 1499 with Vasco da Gama's voyage to the Indian subcontinent and the foundation of the Casa da India (House of India) at Cananor. A factor oversaw warehousing of coconuts, dried fish, honey, oil, rice, and sugar and dismayed Muslim traders by ending their monopoly in pepper and drugs. Before da Gama died of malaria at Goa on December 24, 1524, he established a Portuguese cinnamon monopoly with Ceylon, a promising foothold in the burgeoning European spice market.

From 1560 to 1570, with mismanagement plaguing the venture, King Sebastian I opened commerce to private Portuguese traders. In August 1578, his successor, Henry I, substituted an open monopoly for yearlong contracts. To combat mounting competition by the English East India Company (EEIC), Portugal's economic advisers reorganized the trading system. Under Philip I, the Crown failed to ally with Venetian spice dealers. In 1597, King Philip revived the original monopoly arrangement. Closer scrutiny of the market from 1605 to 1614 failed to produce anticipated revenues. Sailors' complaints of inadequate biscuit, dried fish, olive oil, rice, salt meat, and wine revealed malfeasance of contract provisioners. Impure meat and lack of fresh fruits and vegetables and potable water increased losses of crew to disease.

Under a proposal published by Duarte Gomes Solis in 1628, the Portuguese East India Company aggressively vied with the EEIC and the Dutch using private rather than royal capital. Superintended by Jorge Mascarenhas, Lisbon's mayor, the new stock venture, formed by Philip III, entered its first decade of trade, which included outgoing cargo of alum, cochineal food dye, saffron, and vermilion. Formally incorporated at Madrid in August 1628, the company began collecting customs under royal charter. By cornering trade in Ceylonese cinnamon bark, coral, cowrie shells, indigo, and Malaysian pepper and by pilfering food from the holds of captured Dutch and English merchantmen, the firm prospered at shipping and allowed European dealers to control spice distribution.

The Portuguese enterprise enjoyed low overhead from the peeling and packing of wild cinnamon bark, but it never broke the Dutch control of cloves, mace, and

nutmeg. Although pepper profits reached 143 percent for the cargo of the *Santissimo Sacramento* in 1630 and 153 percent for the *Bom Jesus de Monte Calvario* in 1631, ocean currents and winds took their toll on the original fleet of 15 *naos* (carracks), returning only seven from Goa to Lisbon. In 1632, the monopoly of coir rope from the Maldives, south of India, increased potential for profit, but it could not generate enough cash flow to counter the rise in Indian pepper prices by 40 percent. Retaliation by the English and Dutch, as well as the Dutch blockade of the Malacca Strait, quickly redirected the spice trade away from Portugal. High overhead from military expenses and a falling pepper market in Lisbon compromised profits to the breaking point. Lacking the naval strength to oust rivals, the Portuguese East India Company disbanded in April 1633.

See also: British East India Company; Gama, Vasco da.

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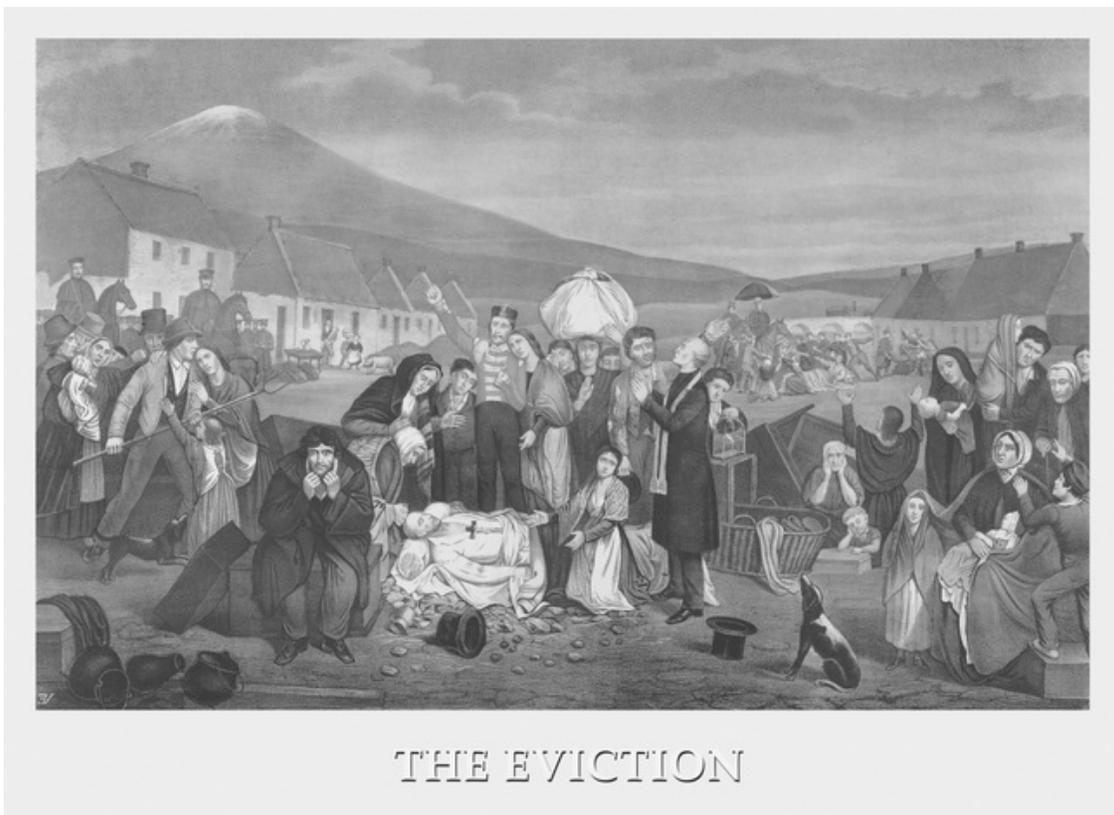
Potatoes

A prolific starchy tuber, the white potato (*Solanum tuberosum*) joins corn, rice, and wheat in supplying the world with carbohydrates. Growing wild from 11,000 B.C.E., the cultivated potato evolved in western South America after 8000 B.C.E. Natural selection among wild hybrids in Altiplano, the upper elevation of the Andes Mountains, generated more than 3,000 cultivars, which Quechua speakers called *papas*.

The Peruvian Inca at Machu Picchu cultivated dozens of potato varieties

within a single plot, a method that reduced the crop failures of monocropping. Because their cultivars were susceptible to storage rot, Bolivian and Peruvian growers freeze-dried tubers under low air pressure at altitudes reaching 10,000–15,000 feet (3,000–4,600 meters). After moisture evaporated, the tubers shrank into light, brittle *chuño*, which remained edible for a decade. Inca cooks reconstituted the wrinkled pantry stock with broth or water.

Domesticated in Bolivia, Ecuador, and Peru, potatoes traveled to coastal tribes, the Haida, Salish, and Tsimshian. When Christopher Columbus first encountered potatoes in Cuba on October 28, 1492, he compared the flavor to chestnuts. Throughout the Caribbean, potatoes impressed Spanish explorers with their addition of an antiscorbutic to staple carbohydrates. Return voyages after 1537 by privateer Francis Drake and historian Thomas Harriot brought the tubers to England, Holland, and Spain. In 1588, Walter Raleigh grew potatoes in his garden outside Cork, Ireland.



An Irish cartoon from the 1840s dramatizes the eviction of a tenant farmer for failure to pay rent. A blight on potato crops caused the death or displacement of millions of Irish, up to one third of whom depended on the

potato for sustenance. (*Buyenlarge/Getty Images*)

In new terroir, the potato developed hybrids, increasing the total to 5,000 cultivars. More growers claimed the tuber in the Canary Islands in 1567 and in subsequent colonies of Kenya, Rwanda, and Uganda. By 1600, enthusiasts spread potato cultivation to Austria, Belgium, China, France, Germany, Indonesia, and the Philippines. Sailors continued the dissemination of seed potatoes to Port Royal, Nova Scotia, where gardeners cultivated them in 1623. Scots-Irish immigrants brought potatoes on their 1719 voyage to New Hampshire, where farmers valued the tubers as hog food.

From the British Isles to Italy, potatoes were reserved for feeding convicts, livestock, slaves, and soldiers and for nourishing hospital patients suffering from consumption, measles, and scurvy. In Kolberg, Prussia, in 1744, Frederick the Great recognized potatoes as a culinary backup. For 30 years, Frederick coaxed farmers into planting free seed potatoes and distributed cultivation and harvesting manuals. An underground crop raised in France, Holland, and Prussia to prevent food shortages, it survived the advance of mounted cavalry through grain fields and vineyards.

Contributing to advertisement of the potato, French nutritionist Antoine-Augustin Parmentier returned from imprisonment in Prussia during the Seven Years' War with a scientific zeal for potatoes as famine food. In 1773, he proposed potato meals to cure dysentery. By 1785, a potato fad increased enthusiasm for the new kitchen garden crop in France, the Low Countries, and Russia, where Catherine the Great ordered the planting of seed potatoes. Pragmatists admired the tuber above the turnip for providing an easily harvested food that cost less than rye and came to table more easily than bread made from milled grain.

Chefs honored Parmentier's campaign by concocting potato hash and shepherd's pie, a one-dish meal of mashed potatoes, ground meat, butter, garlic, onions, and seasonings. The satisfying staple sustained workers during the Industrial Revolution, when cooks in Liverpool, London, and Manchester baked, boiled, fried, and roasted potatoes, steamed and cubed them for salads, and grated them into curry, pudding, and soup. The tuber altered forever the Jewish diet, which had previously favored the egg noodle as a culinary starch. Potatoes bolstered meals of buttermilk and herring, an ethnic cuisine that Jewish

immigrants brought to the Americas. Potato crops flourished in the Monticello gardens of U.S. President Thomas Jefferson and in Colorado, Idaho, Maine, New Brunswick, Oregon, Prince Edward Island, and Washington.

In the late 1700s, while Poles revolutionized vodka by distilling it from potatoes, Norwegians made aquavit from the same source. The rural Irish applied the tuber to runs of *poitín*, a potent moonshine. Ireland experienced a population explosion from weekday meals of milk and lumper potatoes, relieved on Sundays by greens with bacon or oat gruel. The Irish reliance on 12 pounds (5.4 kilograms) per person per week turned the Irish Potato Famine of 1845–1852 into a mass catastrophe of rapid depletion of body mass and malnutrition that reduced the population by 56 percent.

After a two-year process of selection, American agronomist Luther Burbank developed a rare seedpod into the russet Burbank potato, a white-fleshed tuber and forerunner of the Idaho russet. He sold rights to his hearty cultivar in 1874 for \$150. His hybrid relieved the Irish of future famines by combatting *Phytophthora infestans* (potato blight). The problem remained puzzling until French agronomist Alexis Millardet formulated an effective fungicide in 1883. Meanwhile, displacement of the Irish and Scots altered the Australian and North American population and cuisine through immigration of 1.5 million potato eaters to more promising locales.

In the late 1980s, China and India pursued potato production, rivaling the Americas and Europe in mass harvests. In 2007, American hybridizers supplied fast-food chains with a more fibrous tuber for French fries and potato chips. In 2008, formulation of a copper fungicide increased the acceptability of sprays on organic potato fields. Genetic modification by BASF and Monsanto bred cultivars resistant to potato beetles and immune to common fungi. Scientists intended to apply sturdier cultivars to stemming hunger in developing nations.

See also: Famine; Freeze-Drying; Jiménez de Quesada, Gonzalo; Inca Diet and Cuisine; Monoculture; New World Commodities; Plant Disease and Prevention; Scandinavian Diet and Cuisine; South American Diet and Cuisine.

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Poultry

The world's second-most-common food after pigs, avifauna provides eggs, meat, and oil as sustenance and feathers and leather for costumes and furniture. Hunting-and-gathering societies of the Olduvai Gorge in Tanzania as early as 60,000 B.C.E. and of the Paleo-Indian Paisley Caves of Oregon after 12,300 B.C.E. dispatched women and children to search for birds and eggs. Before 7500 B.C.E., Malaysian, north Indian, Thai, and Vietnamese domesticators chose to breed in captivity the red jungle fowl, ancestor of the common chicken (*Gallus domesticus*). Cross-breeding with the Ceylon, Java, and Jungle Grey chickens introduced poultry husbandry into Asian livestock skills as far southeast as Sumatra. Coop keepers discovered that removal of eggs from nests induced hens to continue to produce fresh eggs.

Through observation, Egyptian poulterers timed the natural fattening of wild cranes, ducks, and geese for migration. The house hold of the Pharaoh Ti around 2500 B.C.E. devised a system of force-feeding birds through funnels and massaging the throats to produce artificially engorged livers. At peak time, cooks slaughtered birds to obtain the fatty liver, the forerunner of French foie gras, a luxury smoked pâté. From Egyptian cookery, consumption of birds and eggs influenced North African cuisine as far west as Morocco, but central Africans revered poultry too much for divination and religion to slaughter birds for food.

After 2000 B.C.E., Northeastern Indians and Malaysians bred the deep-breasted Brahmaputra chicken, the largest hybrid, known as *Gallus giganteus*. Compared with the smaller bantam, the hardy Brahmaputra ate sparingly, yet it weighed about 13 pounds (5.9 kilograms), or more than ten times that of the Javanese

bantam. The Brahmaputra laid a 4.25-ounce (120-gram) egg, 33.3 percent larger than the average hen egg, and continued laying in winter when other breeds stopped.

Recipes from state dinners in Assyria and Elam beginning around 1900 B.C.E. summarized cauldron preparation of partridge and pigeon. By 1520 B.C.E., Chinese and eastern Indian breeders produced for the table the Cochin chicken, which attained a weight of 8 pounds (3.6 kilograms). Chinese poulterers developed sophisticated methods of preserving and shipping eggs to Formosa, Korea, Manchuria, and Mongolia. Vietnamese consumers allowed fertilized eggs to develop and ate the unborn chicks, also a favorite of Filipinos. Chinese cooks simmered Cochin carcasses to make stock and preserved century eggs by salting alkaline clay, mixing it with rice husks, and molding it around the shells. In contrast to the Asian relish of poultry and eggs, Javanese and Tibetan Buddhists and Indian Hindus denounced avifauna as food because the birds devoured excrement and worms.

From 1400 B.C.E., Egyptians and Sumerians stocked hen yards and valued ostrich and pelican eggs as temple gifts. Greeks admired Egyptian poultry technicians, who designed a clay brick incubator to increase the size of flocks. Historians surmise that Egyptian provisioners fed chickens and eggs to the builders of the pyramids much as the Chinese raised flocks as food for workers on the Great Wall of China.

Greek writers detailed bird life more as a curiosity of nature than as a source of food. In the *Iliad* (ca. 850 B.C.E.), Homer pictured geese and swans as models of aquatic avifauna. The Greeks preferred the China goose for rich meat and raised quail for their tiny eggs, a table delicacy. Chariades of Athens added a white omelet to the traditional Greek *thríon*, fig leaves stuffed with bacon, cheese, eggs, and milk. For tender meat, Greek importers bought the heavy Rhodian chickens of Delos, Medea, and Persia. According to Greco-Syracusan poet Arcestratus's *Hedypatheia* (*Life of Luxury*, ca. 350 B.C.E.), Greeks emulated the Egyptian method of fattening goose livers, which Arcestratus prized as the bird's soul.

In western Asia, Syrian author ibn Sayyar al-Warraq of Baghdad summarized the Abbasid preferences for bird pies and stuffed and roasted fowl. Babylonians raised chickens for meat as early as 600 B.C.E. and welcomed the first eggs of spring, a forerunner of the Easter egg. Eastern Europeans received the gamecock

and pheasant from Persia and the peafowl from India around 500 B.C.E. Skillful husbandry in temperate zones tamed the greylag goose (*Anser ferus*) into the barnyard goose, which poulterers crossbred with domestic species.

Specialties for the Table

During the Roman Empire, poultry keepers fattened hens on milk, raisins, or bread soaked in wine. Chefs chose eggs of the compact, short-legged Dorking hen (*Gallus pentadactylus*) as a first course. For entrées for feasts, preparers dramatized the goose, pheasant, and swan by decking the roast birds in their original feathers and stuffing them with songbirds. Legionaries introduced the Dorking chicken to Gallic and British Celts for eggs and meat, as well as the Pakistani Asil for cockfighting, perhaps the world's oldest spectator sport, dating to 1280 B.C.E.

Throughout the Middle Ages, the castration of roosters produced plump capons, a common banquet feature. The English and Norwegians developed dishes from gull eggs; Africans preferred guinea eggs, which the birds produced from May until summer's end. Upon returning from China in 1300, Venetian traveler Marco Polo reported that courtship rituals featured Mandarin duck soup. The Dutch and Iberians bred the Hamburg fowl and the glossy black Spanish chicken, a layer of 4.5-ounce (128-gram) eggs. Roman-French food master Taillevent's *Le Viandier* (*The Provisioner*, ca. 1375) praised herbed chicken broth, an eventual basis for early-nineteenth-century French haute cuisine. The anonymous *Le Ménagier de Paris* (*The Goodman of Paris*, 1393) advised on adding eggs to the invalid's diet.

The Western Hemisphere produced unique poultry strains in the Muscovy duck of Brazil, the Argentine rhea, the Chilean Araucana chicken, and the wild turkey (*Meleagris gallopavo*), which ranged from its origins in Mexico to Canada. In the 12-book *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1540–1569), ethnographer Bernardino de Sahagún reported on the turkey, the only domesticated poultry in Mexico. At the Tepeyac market, he found vendors selling 1,600 turkeys a day.

In 1500, Spanish explorer Vicente Yáñez Pinzón introduced Iberian chickens to

Brazil. To the upkeep of Henry VII's house hold, gamekeepers contributed geese, larks, pigeons, partridges, snipe, and woodcocks. After sailing to the New World with Sebastian Cabot in 1516, voyager William Strickland brought the New World turkey home to England, where chefs gilded the skin before presentation. In 1540, the French obtained from Guiana the Muscovy duck, a tender, full-flavored table bird best eaten in its prime.

During meat shortages, Europeans kept poultry yards of chickens, ducks, and geese and hunted coastal puffins, which Christians authorized for the meatless meals of Lent. The laboring class sold eggs and hens as a source of cash. The Aylesbury duck rewarded British keepers with 300 eggs per year in exchange for modest amounts of grain.

French gourmands raised the Rouen duck for its kidneys for pies and for its succulent meat, the result of feeding roasters on horse flesh. Less discriminating diners ranked the Dreux at the top of the chicken market, followed by the Houdan and the Nogent le Roi. Cooks boiled down the feet, head, and neck for chicken jelly and sauce. Mestre Robert (or Rupert de Nola), author of *El Llibre del Coch* (*The Cook's Book*, 1520), a Catalan culinary guide, trusted stews of spiced chicken to revive the sickest patient. In the 1600s, French egg fanciers developed the citrus curd by scrambling eggs with lemon or orange juice.

European immigrants brought to America the Brahmaputra, Cochin, Crevecoeur, and Leghorn chickens, breeds that ensured profitability for the hen yard as well as good gaming for cockfighting. Poulterers ranked the Leghorn tops for eggs and health, and Brahmaputras best for raising chicks for meat. To soften the muscles, coop keepers penned the birds for weeks of fattening on carrots, corn, and pumpkin. The addition of milk and oats to the feed ensured juice in the meat. In 1634, a report on the cuisine of Jamestown, Virginia, noted the availability of capons, geese, stewing hens, and turkeys. Around the Chesapeake Bay, Indians traded stray chickens and turkeys for cooking pots and rifles.

Hen yards relieved some of the problems with food storage in colonial anticipation of hard times. On plantations in the American South, the Caribbean, and South America, slave dealers profited from selling Africans who had experience in raising guinea fowl. Slaves increased personal wealth by keeping poultry at their cabins and bartering eggs and meat for clothing and medicine. For meals at Mount Vernon, Virginia, Martha Custis Washington's *Book of*

Cookery (1749) described how to make chicken pie and olio pie, a catchall of fowl, rabbit, artichokes, potatoes, citrus fruit, and dates. In Australia, Aborigines snared albatross and muttonbirds and robbed their nests of eggs. After 1788, English colonists domesticated the black swan, emu, and ostrich, the world's largest bird and a survival food stuffed and roasted at the fireside.

In 1850, the first Brahmastras arrived in New York. New chicken breeds emerged, making favorites of the Dominique, Rhode Island Red, and Wyandotte. By 1860, importers from the Ukraine brought the Sebastapol goose, a plump bird averaging 12 pounds (5.4 kilograms). American flock keepers boosted the weight by 30 percent through interbreeding with German Embden geese. During the Civil War, Southern women replaced roasted Dorking, Leghorn, and Scotch Grey chickens with songbird pies from blackbirds, chickadees, or robins snared in their yards. By 1880, poultry keeping emerged as an official division in husbandry science.

Industry

American poulterers—usually women—gathered eggs daily. During periods of low demand, they coated shells with butter, paraffin, varnish, or vaseline and bedded them on dry bran or salt to prevent evaporation. Others stored eggs in a crock filled with lime water or glass-water, a silica gel formed from melting sand with alkali. When prices rose in winter for eggnog and Christmas custards, hen yards became three times more profitable than in spring.

In the 1880s, Jewish immigrants to Petaluma, California, turned the region into “the egg basket of the world” for the sale of 100 million eggs annually to Alaska, New York, and the Pacific Coast. Cooks invented egg drop

[Recipe: Kosher Chicken Soup](#)

Slaughter and pluck a plump hen. Soak it in cold salted water to leach out the blood. Coat the carcass in kosher salt and drain it for an hour on a tilted board. Rinse in three changes of cold water. In a large soup pot, cover the

bird in water and add root vegetables—carrots, onions, parsnips, potatoes, rutabagas, turnips. Slow-cook for several hours to surround the flesh with a thick broth.

soup, dumplings, poached unlaidd eggs, mayonnaise, and egg salad, a combination of chopped salted onions and hard-boiled eggs. Kosher cooks experimented with poultry recipes, especially noodle soups. Ashkenazim raised the hen to the height of importance in Jewish cookery, particularly for Sabbath dinner.

Cold storage evened out the seasonal egg business by proving to consumers that refrigerated winter eggs taste as fresh as spring stock. To boost business, promoters in 1915 dropped prices on the spring glut of eggs by half, from 60 cents to 30 cents per dozen. A decade later, the U.S. Department of Agriculture replaced the dating of stock with national egg standards, which graded the size of the air cell in each shell.

Poulterers further lessened the seasonality of the egg business in the 1920s by breeding hens that laid eggs year-round. Farmers tricked chickens by raising them in heated coops under electric lights and by feeding them scientific formulations that increased off-season yield. Treatment with antibiotics reduced disease. By 1946, annual egg production had risen by 67 percent. In the aftermath of World War II, American nutritionists encouraged Europeans to eat more eggs and poultry meat to restore the malnourished to health. Julia Child's *Mastering the Art of French Cooking* (1961) reinstated glamour to poultry by educating Americans on stuffing and trussing a bird for roasting.

Today, growers of chickens, doves, ducks, geese, guineas, pheasants, pigeons, quail, and turkeys favor the chest and leg meat, the muscles developed by locomotion. Cooks value the meat and eggs as cuisine mainstays for buffalo wings, chicken nuggets, omelets, and toppings for salads and tacos. American poulterers raise some 100 strains of chickens; the English and French prefer the Brahma. The golden pheasant remains a prize dish in China, Mongolia, and the Taurus Mountain region. The Chinese, who raise nearly 4 billion chickens per year, enjoy the tea egg, an aromatic treat flavored with cinnamon, clove, fennel, pepper, soy sauce, star anise, and tea leaves. Other egg treats include the batter-fried chicken or quail egg, brined duck egg, soy egg, and spiced iron egg. From

street vendors, Cambodian, Filipino, and Vietnamese diners buy fertilized duck embryos as snacks, appetizers, and aphrodisiacs.

See also: Agribusiness; Animal Husbandry; Cussy, Louis, Marquis de; Polynesian Diet and Cuisine; Tudor Diet and Cuisine.

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Preservation, Food

See Caching; Canning; Curing; Dried Food; Freeze-Drying; Pickling; Refrigeration; Smoked Food; Storage, Food

Processed Foods

See Industrial Food Processing

Prohibition

The control of intoxicating drinks is an old crusade. After 650 C.E., the Koran equated drinking with gambling, both satanic ploys in the view of Muslims.

Historical records from China and Japan report priests and royals hoarding distilled drinks for themselves or for holy ritual. In 1529, Charles V of Spain issued a ban on Aztec tequila, which Indians had fermented from cactus for centuries. His controls failed, just as Asian secrecy lost out to bootlegging and discreetly published home distilling guides. In the British navy in 1740, Admiral Edward Vernon ordered the watering of grog and cut sailors' daily allotment to stem drunkenness on watch.

In North America, where the decades-old temperance movement finally led to outright prohibition from 1920 to 1933, drinking had supported diverse activities. From colonial times, cider and ale served both rich and poor as a form of recreation and a stimulus to group involvement. Taverns provided convenient locales for political and public gatherings, as they did for the Sons of Liberty, a secret anticolonial brotherhood. The cultural and religious mores of immigrant French, Germans, Irish, Italians, Jews, and Poles called for the generous distribution of brandy, beer, and rum, often as additives to sauces and fruitcakes. Religious services, including the Christian Eucharist and the Jewish wedding ceremony and *bris* (ritual circumcision), involved the ritual sipping of wine. Saloons lured patrons with free lunch. Jails bulged with weekend traffic from public drunks and fistfights. After 1832, German immigration made Cincinnati, Ohio, the capital of oompah bands and Teutonic beer steins. Honeymooners flocked to *Bierstuben* (beer halls) and restaurants. Tavern owners put on a conservative front and bolstered their investments by running for city council, constable, or mayor.

Crusading "Drys"

As women's groups grew more vocal in defense of civic decency and family, city accountants pondered in private the effect of prohibition on tax receipts from business lunches and men's lodges. Tourist centers feared that the loss of liquor licenses would scare off investors in restaurants and hotels. To save their jobs, barkeepers and waiters in 1891 formed the Hotel and Restaurant Employees' International Alliance and the Bartenders' International League of America.

Beginning in the late nineteenth century, Protestant prohibitionists and the

Anti-Saloon League, founded in 1893 in Ohio, amplified political pressures to end public drunkenness and squalid taverns. Crusaders succeeded in closing watering holes but failed to stop them from opening in new locations. Restaurateurs, who earned 35 percent of their profits from alcohol, protested controls, which would lower profits to only 15 percent of sales from food and non alcoholic beverage service. Owners of sports complexes, backed by brewers and coopers, protested the loss of beer franchises.

The antiliquor drive failed in New Zealand in 1911 but proved effective on Prince Edward Island in 1907, in Russia and Iceland in 1914 and 1915, and in Norway in 1916. The growing revolt against saloons reached Finland and Hungary in 1919. Some U.S. counties managed to vote “dry,” forcing diners and tipplers to patronize inns across the county line. Prohibition gained momentum after the 1917 declaration of war against Germany. Ostensibly to redirect grain to military use, the War Prohibition Act of November 1918 halted the production and sale of beer, liquor, and wine until demobilization.

Volstead Act

The National Prohibition Act, or Volstead Act, passed by Congress on October 28, 1919, as the enabling legislation of the Eighteenth Amendment to the U.S. Constitution, prohibited the manufacture, transport, and sale of any beverage containing more than 0.5 percent alcohol. Although wine, brandy, and moonshine whiskey headed the list of home restoratives for a variety of illnesses, dry pressure groups such as the Woman’s Christian Temperance Union (WCTU) cheered the defeat of “demon rum” and the attendant corruption from brothels and gambling.

On January 15, 1920, during Warren G. Harding’s successful run as Republican and dry candidate for the U.S. presidency, New Hampshire cast the thirty-sixth and final vote needed to pass the law. Intended to lessen rowdyism, spousal abuse, underage drinking, and child neglect, the squelching of strong drink in reality aroused fierce libertarianism, even among dries. Restricted entertainment ushered in the Roaring Twenties, an era known for the buying and consumption of illegal bathtub gin and flavored wood alcohol.

The ban failed to halt illicit hooch from stills around the nation, particularly in crime-plagued Chicago. Runners made hauls across the Canadian and Mexican borders and turned small investments into millions by smuggling booze from rum factories in Antigua, Bermuda, Cuba, Jamaica, and the Bahamas. Aficionados of speakeasies (places selling illegal alcohol) made dinner reservations under “John Smith.”

Alcohol and Crime

Because of ethnic culinary demands, much of the nation ignored or refused to comply with Prohibition, which suppressed a vast enterprise. In the hard-pressed Appalachians, mountaineers and farmers turned corn into “squeezins,” affectionately known as “ole tanglefoot.” Their under-the-table business caused Treasury Department agents, or T-men, to seize some 670,000 amateur operations and establishments. Raids recouped national excise taxes and protected the unwary from lead-laced brews filtered through car radiators.

In addition to producing alcohol for home use, freelance distillers and distributors supplied speakeasies and strings of fake drugstores, which sold alcohol as a prescription drug. Within a decade, federal officials had collared more than a half million violators. Assistant U.S. Attorney General Mabel Walker Willebrandt sent scofflaws to prison but did little to halt the bootlegging trade.

The glamour of home distilling “sugar moon” and “tarantula juice,” racketeering, rum running, and hauling “white lightning” increased violence from organized crime, raids, and drunk driving. Treasury agent Eliot Ness and his Untouchables earned a reputation for diligence in trailing brewers and haulers to their lairs for highly publicized raids.

Not all of legally mandated sobriety turned tawdry and crime ridden. At Washington Island on Lake Michigan, Danish immigrant Tom Nelson introduced Angostura Bitters, a flavoring invented in Trinidad in 1824 for treating digestive upset and seasickness and for use in cocktails and Caribbean dishes. With the digestive, Nelson perpetrated a legal dodge certified by a pharmaceutical license and handwritten prescriptions.

End of an Era

For professional food service, the Prohibition experiment tolled a death knell for the elegant catering and *table d'hote* dining in fine establishments that had flourished since 1890, the dawn of the Gilded Age. Loss of fine wines substantially reduced the demand for table service; more people stayed home and served wine and liquor from private stock at cocktail parties.

When the era came to a close, the family-centered cafeteria and diner dominated the restaurant scene. On the up side, Prohibition boosted the sale of soft drinks, cooking wines, and flavored brandies and promoted club luncheons and the opening of tearooms, a popular kitchen business for women. For public personalities who had once made grand entrances at New York's Waldorf-Astoria Hotel, being seen required a new thrill, the supper club, child of the speakeasy.

Gradually, the power of the fundamentalist middle class and the solidarity of anti-immigrant and anti-Catholic factions lost cohesion. By 1929, nearly 81 percent of the nation wanted the law repealed or modified. Under the presidency of Herbert Hoover and the rise of the Democratic repeal platform, Prohibition ended on December 5, 1933. Utah became the thirty-sixth state to ratify the Twenty-First Amendment, which overturned the Eighteenth.

See also: Alcoholic Beverages; Beer; Religion and Food; Taboos, Food; Whiskey; Wine.

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Proust, Joseph-Louis (1754-1826)

One of the founders of analytical chemistry, Joseph-Louis Proust identified glucose as the sweetener in grapes and honey.

Born in Angers, France, Proust learned about the elements at an Oratorian college and in the shop of his father, an apothecary. At age 22, he lectured at the royal palace and served at Salpêtrière Hospital in Paris as pharmacist. While he taught chemistry in Salamanca and Segovia, Spain, he published a hypothesis that substances in binary combinations join in fixed and definite proportions by weight. In addition to his studies of bronze and gunpowder, he took an interest in nutritional chemistry and, funded by Charles IV, established one of Europe's most advanced research laboratories.

Proust made his discoveries about food sugar during the chemical revolution that followed the English and French food riots around 1789. While teaching in Madrid in 1799, he noted the presence of three types of saccharine juices in vegetables—fructose, glucose, and sucrose—and demonstrated to his students the chemical makeup of glucose. After purifying sugar syrups through charcoal filters, he isolated four amino acids, elements of protein—leucine in cheese and mannitol in manna and mushrooms, also gliadin in wheat and hordein in barley. He theorized that manufacturers could synthesize nutritional supplements. His discovery offered a cheaper source of sugar than the sweetener crystallized from West Indian cane.

Proust's research provided practical solutions to a European food crisis. In 1809, he isolated sorbitol, a sweetener found in algae, apples, berries, cherries, molasses, peaches, pears, plums, and seaweed. As a sugar shortage destabilized food prices during the British blockade of cane sugar imports from the West Indies, Napoleon Bonaparte offered 100,000 francs to the chemist who could produce sugar from indigenous flora. In 1810, Proust won the purse by extracting dextrose from grapes. His analysis of major nutrients enabled physicians to calculate energy metabolism. For his contributions to science, he earned

membership in the French Academy of Sciences, a Legion of Honor, and a royal pension.

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Pulses

Until the refinement of barley and advent of wheat oven breads about 10,000 years ago, pulse, a lysine-rich paste or porridge of legumes, sustained much of the Mediterranean world and the Middle East. The name *bean* derives from the *baiana* (fava bean) of Baiae in coastal Campania in southwestern Italy. Currently, beans, lentils, and peas dominate peasant agriculture and supply 8 percent of the world's protein, usually in one-pot meals.

Neolithic Syrians plucked wild lentils as early as 12,000 B.C.E., Greek agriculture incorporated lentils before 6000 B.C.E., and farmers in southern Italy, Spain, and Thessaly began cultivating them around 3000 B.C.E. Ancient Jews reserved boiled lentils with eggs for periods of mourning. Broad beans appear to have emerged as wild food in Afghanistan and the Himalayan hill country. Fava bean gardening passed from Egypt north to northern Italy and Gaul and east to Troy and Syria-Palestine, where Muslims incorporated pulses into Ramadan dishes.

Cuisine

Because pulses lack complete protein for sustenance, they entered culinary history among the Anasazi and Aztec in combination with corn. A parallel yoking of staples occurred in ancient Persia and eastern Asia with meat, rice, and sweet-and-sour sauces, such as Persian *polow* and Laotian tofu salad. Early gatherers in the dry areas of Pakistan and Guatemala spread fresh beans and peas in the sun to air-dry, a preservation method that retained fat and protein content while preventing mold.

In the post-Homeric era (after the eighth century B.C.E.) in Egypt and Greece, the more expensive processed peas, either split or skinned, suited boiling and roasting with salt. Split peas accompanied fish and lamb dishes, such as red lentil soup with grilled sea bream. The more sophisticated diner ate bean pods raw or sautéed in oil. The Egyptians turned one pulse, the carob bean, into a sweet drink. Spartans preferred black-eyed peas with figs for dessert.

When social distinctions lowered the prestige of legumes, only the poor in classical Greece served them in *etnos* (bean soup) dressed with vinegar and baked bread from bean meal. Virgil's *Georgics* (29 B.C.E.) lists kidney beans with vetch as "lowly" crops. Similarly judgmental, Trojans grew vetch only for famine supplies and animal fodder.

Priests fed Rome's sacred geese on pulse and employed bean gruel in sacrifices; mothers weaned their children on legume pap. Jokesters teased bean eaters about possible flatulence, a social embarrassment. To prevent intestinal fermentation, cooks grilled or roasted beans, baked them with onions into a casserole, or employed anise, coriander, and cumin seed as natural carminatives.

Health Effects

Classical writings connected the consumption of legumes with sensible diet. Table maxims about moderation warned of gluttony and wine guzzling and encouraged consumption of cheese, fish, and a gruel of beans, lentils, or peas along with whole-grain bread, pork fat, and fresh and dried fruit. In the treatise *De Alimentorum Facultatibus* (*On the Powers of Foods*, 175 C.E.), the physician

Galen of Pergamum respected the chickpea for exciting the libido and breaking up kidney stones. He recommended serving earthy lupine seeds with a tart sauce, such as bulbs or sumac and vinegar.

In the late fourth century B.C.E., encyclopedist Theophrastus of Lesbos, the “Father of Botany,” indicated the centrality of legumes to the Mediterranean diet. He evaluated pulses made from fava beans and lentils, which he considered “heavy” for the body to assimilate. He identified chickpeas and lupines as plants historically stockpiled as famine food and described the nitrogen process by which legumes enrich soil.

Apicius, a Roman cook around 40 C.E., advised cleaning and soaking legumes as a means of tenderizing the thiamine-rich outer coat. He touted the blending of eight leafy greens with three types of pulses and barley for a vegetable *tisana* (pottage), a digestible ragout high in fiber and protein. The stew parallels the ingredients of a Moroccan *harira*, as both generate aroma from coriander and onions. In Renaissance Venice, a similar blend of beans, pork, and flavorings with a generous topping of cheese and lard made the filling of *torta de faxolli freschi*, a crusty bean pie.

A Versatile Staple

Beans and peas took their place in culinary history in unique forms, such as the eastern Mediterranean fried chickpea ball, Venezuelan tonka beans fermented in rum, Australian bush tucker bean cakes, and the Genoan chickpea crepe. In his memoir *Travels of a Philosopher; or, Observations on the Manners and Arts of Various Nations in Africa and Asia* (1770), Pierre Poivre, a French botanist and biopirate, acknowledged the vegetarianism of Hindus of Malabar, India. He approved an abstemious diet based on butter, fruit, and grain and pulses but nothing that enjoyed an animal life.

On the American frontier, pulses acquired their own culinary lore in chuck wagons, log cabins, and sod huts. As a prevention of scurvy, green beans became popular provisions for sailing crews and prison labor camps. Among rural Southerners, the lengthy cooking of black-eyed peas or pinto beans in fatback, the fatty outer skin of the pig, produced a rich pot liquor in which to sop corn bread

or biscuits. Families used the pot liquor as an all-around curative for anemia and coughs.

Lebanon and Syria, both influenced by Ottoman Turk cookery, valued pulses and bulgur, or cracked wheat. In India, sweets made of chickpeas or lentils, seeds, and dairy products produced *halva*, a dense confection suited to hospitality and dinner parties. In Iran, sour pulse soups got their savor from herbs. In Britain and Luxembourg, ham and pea soup bolstered limited menus during the rationing of World War II.

In World Kitchens

Pulses retain their importance to contemporary global cookery. In sub-Saharan Africa, the collection of pigeon peas and winged beans in the wild provides both porridge material and green pods as a vegetable. Less dependable, the adzuki bean grows slowly and withers from frost. Intercropped with rice, rapeseed, or millet, legumes offer sources of plant oil and meat substitutes and pair well with rice and with buckwheat and teff flour pancakes.

The chickpea and split pea, two affordable pulses in Eritrea, Ethiopia, and Sudan, contain less protein than other legumes but suit infant and invalid needs for their digestibility, especially in mush. Unlike the poor of Bangladesh, consumers in Kenya, Malawi, Tanzania, Uganda, and Zimbabwe rarely incorporate the chickpea in their native cuisine. In India, chickpea snacks satisfy while bolstering nutrition. In central and western India, the drought-resistant moth bean generates sweet sprouts for salad and pairs well with pearl millet and sorghum.

Pulses, such as the lima bean of Madagascar and the United States and the tepary bean grown in Mexico, make excellent meal extenders. Growers produce dense populations, especially in the case of pole beans, sugar snap peas, and climbing scarlet runner beans. Legumes also store well as mature seeds and ward off weevils. Most species suit varied recipes, such as the mix of mung beans or soybeans with foxtail millet or noodles in China. Southeast Asians add soybean sprouts, both fresh and fermented, to salads and sell their crops commercially for the production of soy cheese, curd, milk, sauce, and tofu.

Cooks in the Caribbean prefer legumes in the immature stage, particularly haricot verts and pickled pigeon peas. In Bulgaria and other parts of southeastern Europe, broad beans, dumplings, and cabbage accompany poultry and pork. To facilitate the breakdown in the stomach of the outer legume coat, cooks parboil and rinse or add a pinch of baking soda to the boiling water.

Legumes provide valuable sustenance to the marginally arable fringe of the Sahara Desert. In Botswana, Burkina Faso, Mali, and Nigeria, the Bambara groundnut boosts crop income for smallholders because of its stable price in farmer's markets. Nutritionists with the International Bambara Groundnut Network have hopes of exploiting the peanut as a canned staple and a rescue food for "hungry times."

See also: Agriculture; Cereal; Italian Diet and Cuisine; Roman Diet and Cuisine, Ancient; Sicilian Diet and Cuisine.

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[Randolph, Mary \(1762-1828\)](#)

Renowned author Mary “Molly” Randolph compiled America’s first cookbook, a guide to enhance regional Tidewater cuisine called *The Virginia House-Wife* (1824).

Born to Anne Cary and Thomas Mann Randolph on August 9, 1762, Randolph grew up on the plantation of her maternal grandparents at Amptill, Virginia. In addition to tutoring, she learned house hold skills, including the supervision of food preservation and slaves. After marrying a cousin, David Meade Randolph, at age 18, she settled on the James River on a 750-acre (300-hectare) plantation at Presque Isle, northeast of Hopewell, and reared their nine children.

Randolph’s eclectic sources illustrate the evolving nature of regional cuisine. She drew heavily on Englishwoman Maria Rundell’s *New System of Domestic Cookery* (1807). In her own education, Randolph came in contact with French-educated chefs at Monticello, home of her kinsman Thomas Jefferson. She seemed unaware that “gazpacho” was Spanish, “dough-nuts” were German, clotted cream came from England, polenta originated in Italy, and eggplant and field peas derived from the diet of black slaves.

After a move to Richmond, Randolph acquired a reputation for cookery and entertaining prestigious families. In 1800, the family lost its position in society after President Thomas Jefferson fired David Randolph from his post as federal marshal. Mary Randolph opened a genteel boardinghouse, which admirers dubbed “the Queen.” In retirement in Washington, D.C., she collected house keeping advice and recipes in *The Virginia House-Wife; or, Methodical Cook*, a concise review of unfussy colonial and postcolonial tastes.

Randolph’s collection featured the Southern specialties that anchored regional cuisine. Her list included the first published mention of “gumbs” (later, “gumbo”). She recorded recipes for baked ham and roasted game, corn bread and hominy, sweet potato pudding, turnip greens with bacon, and hot breads and hush

puppies, antebellum table fare based on local produce. She recommended cinnamon and brandy as flavorings and introduced macaroni and vanilla to Virginia cookery. The range of entrées included organ meats and eel, plus forcemeat, field peas, fried oysters, and rice waffles, the economical choices for straitened circumstances. She also outlined a method of hang-drying a calf stomach as a source of rennet.

Because Randolph supervised slave kitchen help, she made light of a half hour's beating of biscuits with a pestle. Her respect for side dishes appeared in recipes for Jerusalem artichokes and salsify and for "Tomatoe & Ochre Soup," a dish with West African origins that emerged in the Caribbean as callaloo. For dessert, she favored puddings and fritters as well as cold creams and jellies. Her dessert collection was the first American anthology to feature ice cream and sherbet. True to her sense of order, she concluded sections on pickling and cordials with directions for making soap and starch along with silver polish and stove blacking.

See also: Cookbooks; Ice Cream; Ketchup.

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Rationing

The allotment of foods during wars and national emergencies is a pattern that has

affected much of culinary history and human diet. Systematized rationing reached new levels during the global conflicts of the twentieth century.

World War I

In January 1915, six months into World War I, Germany's Bread Supply Office began rationing baked goods in Berlin. The stress of making the system work fell on bakers, who kept flour inventories for government perusal. Throughout tenements and bakeshops, where people spent 12 percent of their income, commerce via paper coupons distributed weekly compromised social harmony and consumer cooperation.

Theft of ration cards from food commission offices increased during winter 1916–1917. To enforce codes and restrictions, officials raised fines and jail sentences and guarded coupons as though they were cash. Retaliation against black marketers alienated consumers, primarily women. Shortfalls seriously undermined the war effort as Germans began to think like hungry individuals rather than as patriots. Some acquired permanent digestive ills ranging from dyspepsia to ulcers.

The home kitchen became a battleground as women helped noncombatants endure by wise provisioning and skilled cookery adapted to the nation's needs. From 1914 to 1918, some 200 war time cookbooks from various associations aided German and Austrian women in their work. Compiled by food writers and domestic science teachers, they bore similar titles—Hedwig Heyl's *Little Wartime Cookbook* (1914), Anna Larisch's *160 Recipes for Wartime* (1915), Josephine Nagel's *The New War-Cook* (ca. 1915), Maria Schneider's *The Rhineland Cook in War time* (1915), Louise Holle's *Practical War Cookbook* (1916), and Mary Hahn's *War Cookbook* (1916).

These works bore statements intended to alter cultural foodways to suit the supplies at hand. Women learned to substitute turnips for meat and to enhance menus with more skim milk and cereals, especially barley, buckwheat, corn, groats (hulled grains), millet, and oats. To keep children from starving, families made the most of butcher bones and black bread and extracted personal favors from neighborhood grocers where possible. Even older consumers and the

disabled stood in breadlines stretching for miles. Shoppers besieged bakeshops, where bakers cut wheat flour with barley, oats, and rye to stretch supplies. Food riots were common, but strictly censored mail kept the news from men at the front.

At the war's outbreak, the German Navy inflicted a submarine blockade on Britain, an island dependent on imports. During winter 1916, U-boats destroyed convoys carrying 300,000 tons (270,000 metric tons) of food per month. By March 1916, the total rose to 507,000 tons (460,000 metric tons). British families suffered from shortages of meat, potatoes, and sugar. To survive, Britain upped food production, succeeding at its maximum wheat harvest. By winter 1917, however, fear gripped Britons and fueled panic buying and hoarding. In January 1918, the Ministry of Food reduced consumption by rationing sugar, followed by fresh meat.

In the United States, the American Dietetic Association got its start in 1917 in part from the need for food conservation. To ensure economy in hospital kitchens, staff and student nurses weighed each day's garbage and adjusted portions to reduce waste. Nutritionist Mary Swartz Rose, deputy director of New York's Bureau of Food Conservation and the author of *Everyday Foods in Wartime* (1918), informed homemakers how to economize on pantry supplies. The U.S. Food Administration legitimized domestic science as part of the chain of command enforcing stern measures. Government spokesman Herbert Hoover expressed his enthusiasm for thrift in the slogan "Food Will Win the War!"

World War II

Preceding World War II, German officials encouraged housewives to save on food and charcoal and to cook one-dish meals. To even out goods in short supply, the food commission rationed fats, meat, and sugar. In September 1939, the bureaucracy distributed to each civilian monthly perforated ration cards to separate at the time of purchase. Only those with physically demanding jobs received extra compensation. For a decade, potatoes and root vegetables were available but butter, chocolates, and whipped cream were unthinkable indulgences. When imports dwindled, cooks served roasted grain beverages in

place of coffee. Cafés had no bananas or Coca-Cola to sell.

As Nazism increased persecution in Warsaw in 1939, anti-Semitic Poles burned ghetto markets, which laws had closed. Farmers grew anxious to sell perishables. Against the tide of hatred that limited Jewish commerce, vendors took their goods to the streets. Jewish house wives crowded into outdoor stalls to buy supplies threatened by increasing anti-Semitic sentiment. By 1942, the situation had declined to desperation for the hungry. Firing squads executed food vendors who sold illegally to Jews.

Facing more dire situations were the thousands of displaced persons and camp internees. In September 1941, memoirist Esther Rudomin Hautzig, at age nine, endured the hardships of a deportee living in a prison commune on the Russian steppes far from her home in Vilna, Poland. In a memoir, *The Endless Steppe* (1968), she recalled the early arrival of cold weather and desolation at the distribution of bread and a small allotment of *brinza*, a sheep cheese stored in barrels of saltwater. Because deportation had begun after the planting season, the family had vegetable stores. To supplement the meager allotment, she gleaned tiny green potatoes that growers had left behind.

When the siege reached its height in April 1943, a dearth of staples limited home cooking. The rich hoarded goods, but poor families lacked the cash to stock up for hard times. House wives cooked unpeeled root vegetables to preserve every scrap of nourishment. Eventually, shoppers found no food for sale. Temporarily, Nazis distributed free bread. Relatives sent food parcels through the mail, which post office workers pilfered.

Throughout Europe, homemakers, professional cooks, and the military mess hall scrimped on nutrition. Of shortages and hunger, Soviet Premier Nikita Khrushchev declared that the Russian army would have gone hungry if it had not been for Spam, a canned chopped-meat product requiring no refrigeration. The J.C. Hormel Company in Minnesota had begun exporting Spam in 1937 under an acronym for “shoulder of pork and ham.”

In Japan, desperate shoppers joined queues without knowing what they were waiting for. While taxation rose 150 percent to diminish citizen spending power, normal consumption of rice dropped by one-quarter. A distribution system monitored the quotas on farms. To prevent neighborhood dissension, individuals said little about grocery purchases. Those with food boiled it rather than broiling

it, to keep aromas within the kitchen. The government control of rice remained in effect until 1995.

In England, officials assigned 40,000 conscientious objectors to work in agriculture and launched Food Defence Plans to protect ware houses and bond stores against bombing. Staff issued ration books color-coded by the receiver's age and required consumers to register with a grocer. To increase social cohesion and quell panic, posters urged "Serve to Save" and "Your Country Needs You." In addition to promotion of food distribution, families surrendered pots and pans for recycling as munitions.

For more than 14 years, from January 1940 to July 1954, British cooks learned methods of replacing in recipes such ingredients as bacon, bananas, canned fish cheese, eggs, grapes, ham, jam, lemons, onions, pepper, and sugar and of feeding their house holds on what ever the market provided. They subsisted on a seriously restricted weekly allotment:

- One egg
- 2 ounces of tea
- 4 ounces each of bacon, ham, and butter
- 3 pints of canned milk
- 8 ounces of jam, marmalade, syrup, or treacle
- 8 ounces of cheese, which shrank to 1 ounce by May 1941
- 12 ounces of sugar, cut to 8 ounces after Christmas 1940
- 16 ounces of other meat

A complicated point system supervised the sale of biscuits, canned goods, dried fruit, jam, and rice, but butcher shops could sell unrestricted amounts of bones, sausage, and offal, consisting of brains, gizzards, hearts, kidneys, and livers. Hunters and trappers supplemented kitchen stocks with rook (crow) and squirrel.

Beginning in 1940, Frederick James Woolton of Liverpool, the British minister of food, forced farmers to slaughter dairy herds to free pastures for growing grain and vegetables. The move produced an immediate milk shortage. Advertisements lauded high-energy foods and protective substances, especially oatmeal and cod liver oil. The ministry organized Kitchen Front exhibitions at Harrods department store and investigated bartering and black market systems. For those sellers who violated regulations, the ministry confiscated goods and fined them £100 or

sentenced them to three months in prison.

The ministry created a meatless recipe dubbed Woolton pie, an unappetizing pastry consisting of carrots, onions, cauliflower, and swedes (rutabagas) baked in a crust and topped with mashed potatoes. Staff also pushed carrot marmalade, toffee carrots, and carrolade, a nourishing beverage made from carrot and swede juice. The military experimented with high-carotene carrots and synthetic carotene to rid pilots of night blindness. Producers of margarine bolstered its questionable nutrition with artificial vitamins A and D.

Shortages and Substitutions

The spread of combat throughout Europe created shortages in coconut and olive oil, sage from Greece and Yugoslavia, French thyme, Hungarian paprika, saffron from Spain, and, in the last two years of World War II, Indian peppercorns. An advanced form of dehydration—producing what *Popular Mechanics* touted as “mummy food”—helped simplify food packaging and distribution by removing water to make the stock lighter and easier to pack in duffel bags. In *House Beautiful*, Clementine Paddleford’s “What War Has Done to Life in the Kitchen” declared that egg yolk, fruit, milk, soup, and entire dinners came to the kitchen dried. With the era’s forced cheer, she quipped, “Slip the grocery assortment in your pocketbook and be your own delivery boy.”

Families began making substitutions—sunflower and corn oil for olive oil and butter and corn syrup, honey, and molasses for sugar. Jews and Muslims traded bacon and meat allotments for more cheese and vegetable oil. Clarence Birdseye, inventor of frozen foods, suggested the replacement of scarce livestock meats with lynx muskrat, prairie dog, seal, and squirrel. To ensure adequate intake of vitamins and minerals, a spokesperson for Women in National Service urged homemakers in the October 1943 issue of *Ladies’ Home Journal* to bake with enriched or whole-wheat flour. A simpler end avoidance of rationing was the purchase of store-bought breads, cakes, and pastries.

The Royal Horticultural Society publication *The Vegetable Garden Displayed* (1941) and Constance Spry’s *Come into the Garden, Cook* (1942) recorded “Dig for Victory” efforts to replant lawns and rose beds with kitchen gardens. Food

writers based their recipes on make-do— salmon custard, baked pig’s cheek, tripe and onions, and desserts improvised from prunes and rice. In Ireland, cooks baked soda bread and mashed parsnips with bananas and pineapples for flavoring. Leaflets urged heating only enough water necessary for tea and using oven heat and steam to cook several dishes at one time.

Aiding British civilians from 1942 into the postwar period, Marguerite Patten, a food consultant for the Ministry of Food, broadcast five-minute radio segments of “The Kitchen Front.” To help a nation of meat eaters adapt, she informed struggling consumers on stretching limited supplies, such as tuna, whale meat paté, mock crab made from sour milk, and an oily barracuda called “snoek.” She helped the average cook incorporate brown bananas, fatty-tasting corned beef from Argentina and New Zealand, pilchards and Canadian salmon, and powdered eggs.

The worst times were the dead of winter, when grocers had less produce available to tempt consumers and when school lunchroom staff was reduced to frying Spam fritters. Patten created such inventive recipes as pease pudding, faggots (offal meatballs), and gingerbread with applesauce to relieve tedium, one of the psychological factors that worsened during German aerial attacks.

The tightening of belts bolstered the nation’s health, in part because rationing equalized food supplies for the rich and poor. Families refined their menus with the brown Hovis loaf, husk bread, and the national loaf, a calcium-fortified whole-grain bread that replaced white bread.

Pregnant and nursing women drank a pint of milk a day. Nursing mothers and young children received oranges and orange juice, milk, and cod liver oil. In lieu of tea, older children got high-energy fruit juice, dried fruit, and chocolate. Preschoolers devoured a pound of oranges per week as well as rose hip syrup. Cartoon characters Dr. Carrot and Potato Pete encouraged the eating of healthful home meals; school lunches centered on vegetable pie and the Oslo meal, salad with bread, cheese, and milk. As a result, children flourished under a more balanced diet that reduced fat and sugar.

American Rationing

After the United States entered the fighting in December 1941, supporting the war effort formed a turning point in American diet. Worse than the privations of the Civil War, which afflicted people unevenly, the rationing and limited selection of foods during World War II affected all lives, particularly the stay-at-home mom, emblem of home and sanctity. While noncombatants reduced their consumption of meat to 125 pounds (57 kilograms) annually, soldiers increased theirs to 360 pounds (163 kilograms) and returned home heavier.

To maintain military supplies, the U.S. government restricted most commodities at some time and issued “Basic 7 Food Group” and “Recommended Daily Allowance” charts. An executive order from President Franklin D. Roosevelt in August 1941 established an emergency allotment board, the Office of Price Administration (OPA), which registered a half million dealers and 150 million consumers.

The war time bureaucracy slowed the sugar trade in April 1942, forcing movie concessionaires to abandon candy and cola in favor of popcorn. In May, authorities issued ration stamps in paper booklets to every citizen with the promise of “your fair share of goods made scarce by war.” Immediately, families began hoarding. An underground enterprise stockpiled goods for black market sale.

In September 1942, the Food Requirements Committee initiated the assistance of women’s magazines to circumvent unfair and illicit practices. *Women’s Day* helped cooks alter their habits to conform to dwindling supplies. In a call for fair play, the October 1943 issue of *Ladies’ Home Journal* published “Let’s Face the Facts about Food,” charging that buying rationed groceries from black marketeers was “like sniping our fighting men from behind.” The Crosley Refrigerator Company advertised its patriotism in the February 12, 1944, issue of the *Saturday Evening Post* with an upbeat slogan: “Planning meals is the way *I* can fight.”

To give sidelined noncombatants a positive role, the Office of War Information urged women to garden and preserve food and to pay legal prices and ration stamps for groceries. The University of California ranked spinach as the top crop for efficiency and nutrition, followed by carrots and onions. The slowest-growing and least productive included asparagus, watermelon, and lima beans. Cities supported home produce by rescinding anti-livestock ordinances and urging the sharing of eggs and rabbits. Families raised 40 percent of all vegetables and

canned 4.1 billion jars of food, yet one-quarter of Americans experienced hunger.

Anthropologist Margaret Mead headed the Committee on Food Habits (CFH) to promote family nutrition without undue coercion or limitation. Committeeman Kurt Lewin, a noted psychologist, created methods of dispensing canned milk to children and enticing them to eat unappealing organ meats and soybeans. To lessen the insult of orders from pompous, faceless nutritionists, the CFH instituted a block plan to distribute meal-planning advice through neighborhood volunteers.

Cookbook authors made their pitch to the beleaguered homemaker. Witty food writer M.F.K. Fisher suggested ways of cooking unfamiliar parts of animals in *How to Cook a Wolf* (1942), which included a goulash of ground meat and vegetables she called “Sludge.” An upbeat pamphlet from Betty Crocker called *Your Share* (1943) outlined the hobo party, a bandanna dinner served around an empty stew kettle placed over red paper flames for “roughing it” ambience. Lotta Jean Bogert’s *Good Nutrition for Everybody* (1942) called war time exigencies a time to bolster family health and happiness through efficiency and nutrition. Marjorie Mills introduced *Cooking on a Ration: Food Is Still Fun* (1943) with an assurance that cooks could continue making nourishing meals while promoting cheer and neighborliness. Susan B. Anthony II published a meatier challenge in *Out of the Kitchen—Into the War: Women’s Winning Role in the Nation’s Drama* (1943). The American people, who were used to a high standard of living, struggled to control kitchen excesses.

As the war advanced into the Pacific, rationing intensified. To ensure a fair share, one by one, the government added coffee, canned goods, meat, cheese and dairy products, and fish to stamp books. The added paperwork annoyed local grocers and butchers, who had to account for commodity inventories and dispersal. As wheat supplies dried up, ice cream vendors improvised a new cone-making flour from crushed, sweetened popcorn.

In 1944, singer Kate Smith praised the women who obeyed the law by canning vegetables from some 20 million Victory Gardens. George Burns and Gracie Allen’s radio program lauded the house keepers who removed tops and bottoms of tin cans, soaked off the labels, and flattened the cans. Public-spirited groups held scrap metal drives and garnered bacon grease, meat drippings, and skillet fat to make glycerine for explosives.

Part of the acceptance of frozen goods derived from war time exigencies and labor shortages. Female defense plant workers, romanticized as Rosie the Riveter, had less time to cook from scratch. At the same time, the government rationed canned goods to reserve tin for military use.

For Japanese Americans, forcible evacuation from their homes into internment camps meant a severe disruption in ethnic diet and family-style eating. In a poignant memoir of her family's sufferings, writer Jeanne Wakatsuki Houston joined husband James D. Houston in writing *Farewell to Manzanar* (1973) three decades after her family lost everything during a miserable incarceration. The 1976 film version contrasted prewar eating at home in Ocean Park, California, with the mess hall at Manzanar, a tar paper concentration camp near Death Valley.

After the Japanese surrender in August 1945, the OPA rescinded rationing, ending controls on meat and butter on November 23, 1945. More welcome was the end of rice distribution centers, to which house wives carried backpack baskets woven tightly and frequently inspected for holes to assure the safety of each grain. Only sugar restrictions remained in effect until June 1947. The end of hard times brought a hunger for expansive cookery and varied flavors.

See also: Corn and Maize; Honey; Israeli Diet and Cuisine; Kebabs; Russian Diet and Cuisine.

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Raw Cuisine

Raw foodism, or rawism, allows the consumption of only unheated foods, primarily beans, grains, fruits, nut pastes and seeds, plant oils, land and sea vegetables, juices, and fermented or uncooked meats. The focus of eating so-called living food is the preservation of digestive enzymes and nutrients, which high temperatures denature and destroy. Stressing organic produce and unprocessed ingredients, raw food advocates eat sensual, uncomplicated dishes comprising dried and fresh fruits, legumes, nut patties, olives, sea salt, seeds, and unfiltered honey.

Uncooked meals satisfy rawists with aroma, flavor, and mouthfeel. Their selection of vegetables includes blended energy drinks, dulce and kelp, high-protein pumpkin seeds, and sprouts. In place of processed chocolate and sugary sweets, they flavor raw dark chocolate pie with agave syrup, a natural nectar extruded from cactus, and sundaes made with raw ice cream and Thai coconut.

According to legend, from 130 to 27 B.C.E., fasting and raw foodism influenced the Nazorean Essenes, the ascetic authors of the Dead Sea Scrolls who retreated to a compound at Wadi Qumran, the desert frontier near Jericho. Historically, uncooked cuisine came naturally to polar peoples, for example, the Inuit of North America or the Nenets of Siberia. In addition to berries and the seaweed and vegetation retrieved from bird stomachs, polar residents eat organ and muscle meat raw because of their lack of burnables for cook fires.

Another culture that consumes a raw diet, the Hunza of northern Afghanistan and Pakistan, produces many centenarians. Researchers credit longevity to a vigorous lifestyle and the eating of almonds, pome fruit, mulberries, onions, pomegranates, pulses, raw goat's milk, and wild plums washed down with melted snow. The contemporary holistic physician and nutritionist Gabriel Cousens refers to the action of such living foods as "youthing," the shedding of dying cells and toxins and the growth of healthy blood cells and energized tissue.

Raw cuisine research began late in the nineteenth century. In 1897, a Swiss

physician named Maximilian Oskar Bircher-Benner introduced raw foodism at a Zurich sanatorium, the Bircher-Benner Clinic. In 1905, he formulated a dietetic theory of well-being through consumption of uncooked foods. In the early 1900s, Scots nutritionist Norman Wardhaugh Walker, the “Father of the Raw Food Movement” and inventor of a juicer, taught a form of rawism he called “vibrant health.” Among the foods he banned were bread, pasta, rice, and sugar.

In 1936, holistic dentist Weston Andrew Price of Newburgh, Ontario, examined the teeth of the first generation of pasteurized milk drinkers. After studying the mouths of aborigines in Africa, Australia, Europe, North America, and Polynesia, he concluded that indigenous diets produced stronger jaws. In older people who lived closer to nature, he observed less malocclusion and fewer dental caries because their intake was richer in raw nutrients.

More recent nutritional theories from the National Cancer Institute and the University of Toronto approve the raw food movement for boosting gut flora with bacteria beneficial to the immune system and for ridding the diet of dyes, fats, flavorings, preservatives, and stimulants, including alcohol, caffeine, and tannins. The high antioxidant count allegedly suppresses premature aging and breast, colon, and stomach cancer.

The documentary *The Beautiful Truth* (2008) corroborates the detoxification theories of German internist Max Gerson. In 1927, Gerson charged the modern diet with poisoning the body by reducing the digestibility of foods by polluting them with additives, alcohol, pesticides, and pharmaceuticals. Adherents to Gerson’s theories have included actors Woody Harrelson and Demi Moore, couturier Donna Karan, and model Carol Alt.

Followers of a raw omnivorous regimen eat more than the stereotyped meal of greens and apples. Their intake of living foods ranges from alga, unpasteurized dairy foods, distilled water, fresh eggs, and sprouted lentils to fermented, seared, and uncooked fish and red meat, including carpaccio, ceviche, and sashimi. Proponents claim that the unheated ingredients in citrus salads, gazpacho, melon sorbet, muesli, nut butter, smoothies, sun-dried tomatoes, and sushi cleanse and rejuvenate the body, producing euphoria and a sense of wellness. For clearer skin, raw foodists rely on bee pollen and goji berries, two valuable antioxidants and appetite stimulants. For libido, they choose *maca* and *suma* roots and yerba maté (holly tea) flavored with stevia, a natural herbal sweetener.

Nutritionists disagree on the principles of eating uncanned, uncooked, unfrozen, unsmoked, and unirradiated foods. Critics of rawism point to amenorrhea, childlessness, dental erosion, gastroenteritis, osteoporosis, underweight, and vitamin B12 deficiency as evidence of serious flaws in the diet. In 1997, California physician Steven Bratman, an expert on alternative medicine, coined the terms *orthorexia* and *orthorexia nervosa* to identify an eating disorder in people obsessed with health food regimens and righteous dieting.

See also: Cookware; Fructarianism; Huou; Japanese Diet and Cuisine; Kitchen Gardening; Symbolism, Food; Veganism.

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Refrigeration

Technological advances in refrigeration replaced tedious brining, drying, fermentation, pickling, salting, and smoking with a method of preserving fresh goods without altering taste or texture. Prehistoric hunters stored fish and game in caves, pools of meltwater, snowbanks, springhouses, or underground caches. In India after 3000 B.C.E. and in Egypt and Persia from 2500 B.C.E., house holders used evaporation from clay jars as a means of lowering the temperatures of cooked foods and wine.

The Nigerian pot-in-pot chiller, or *zeer* pot, required the lining of a porous outer container with damp sand and a covering of a ceramic lid or cloth. As fluid

evaporated, the outer layer drew latent heat from the inner pot. The method reduced spoilage in eggplant and tomatoes, increased culinary quality and variety of carrots and okra, and gave growers a longer window of commercial profit from greens, meat, peppers, and sorghum.

Around 1175 B.C.E., Chinese storage methods required the harvesting of ice for long-term chilling. In Greece, Rome, and the Middle East, food preservers lined ice houses and storage pits with grass, logs, and straw before packing snow on the bottom and placing perishables on top. In 765 C.E., the Abbasid Caliph Muhammad ibn Mansur al-Mahdi turned snow into a means of chilling food during caravan transport over the Arabian Desert from Mecca to Baghdad. For a coolant, he collected snow for packing it around his goods.

Refrigerants remained primitive until the 1600s, when French chemists added saltpeter (sodium nitrate) to coolants to harden water into ice. The popularity of iced beverages and desserts supplied a new dimension to culinary service. World demand for chemical refrigerants gave Chilean and Peruvian shippers a source of profit in the food business.

The First Refrigerators

In 1748 at the University of Glasgow, Scots agronomist William Cullen experimented with the boiling of diethyl ether, which, when boiled, absorbed ambient heat, thus dropping the temperature. Cullen applied the concept to an artificial refrigerated environment, which he demonstrated to the public. The widely acknowledged father of refrigeration, Oliver Evans, an engineer from Newport, Delaware, invented a refrigerator in 1805 by applying vapor compression to an enclosed space. As a pragmatic example of the value of technological chilling, German immigrants to North America introduced lager, a brew cooled during processing for year-round availability and consistency.

On August 14, 1834, mechanical engineer Jacob Perkins of Newburyport, Massachusetts, patented a refrigerator that cooled fluids and made ice by means of a crank-operated compressor. On May 6, 1851, physician John Gorrie of Apalachicola, Florida, actualized the theory of refrigeration into a commercial machine containing radiating coils to channel compressed gas. He mounted his

device in patient rooms to cool the air, chill beverages, and help suppress fevers from tropical malaria and yellow fever. Two years later in Cleveland, Ohio, entrepreneur Alexander Catlin Twining patented commercial chillers that made 83 pounds (38 kilograms) of ice per hour.

Technology Advances

Advances altered the awkward early systems into dependable means of preserving foods. In Geelong, Australia, Scots inventor James Harrison applied the vapor-compression refrigeration concept at abattoirs, bakeries, breweries, confectioners, and pasta shops in the 1850s. He intended the device to boost Australia's advantage against the U.S. meatpacking monopoly by generating 275 pounds (125 kilograms) of ice per hour. The first delivery of chilled beef to England failed, thus confirming consumer skepticism about the edibility and purity of refrigerated meats.

With urban growth came a higher demand for fresh fruit, meat, milk, and vegetables, the beginnings of a nutritional revolution in industrialized countries. Geography no longer prevented Kansans from eating oysters or Quebec grocers from selling strawberries. In Moislains, France, in 1859, engineer Ferdinand Pierre Edouard Carré's ammonia-based absorbent refrigerant set a model of low temperatures for industrial chilling. His model produced 440 pounds (200 kilograms) of ice per hour. Carré demonstrated the device at the Universal London Exhibition in 1862 as the future of long-distance transport of frozen foods.

Ironically, refrigeration was becoming the norm in North America while ice remained a rarity in Europe. During the American Civil War, privateers met the South's need for ice by smuggling a Carré model through the coastal blockade to San Antonio, Texas, where food shipper Daniel Livingston Holden made clear ice from distilled water. Meanwhile, the English preferred their beer warm; European cooks continued to shop daily for fresh fish, grapes, meat, and salad makings. Italians demonized ice as a deterrent to appetite and gastric health. And the French suspected cold storage as a means of hiding deterioration in old stock.

By the late 1860s, rapid ice production simplified transport of berries, butter,

milk, and seafood in refrigerated railcars, invented in Detroit by John B. Sutherland. The first shipload of frozen beef reached New Orleans from Texas in 1868 and appeared on the menu at the St. Charles Hotel. In 1870 at Samuel Liebmann's Sons Brewing Company in Brooklyn, New York, mechanical refrigeration turned yeast-fermentation brewing into a controllable science. A year later, Daniel Livingston Holden launched the first refrigerated abattoir at Fulton, Texas, the model of a technologically advanced industry.

Commercial refrigeration replaced reliance on polluted ice from ponds with a clean, year-round source of chilling and freezing. In 1873, the first rail shipment of Texas beef reached New York simultaneously with the opening of the nation's first ice plant at Jefferson, Texas. More commercial ice factories operated at Austin and San Antonio, Atlanta, Chicago, and Pittsburgh, reaching a total of 766 across the nation by 1900.

Simultaneously, during the 1890s gold rush in Coolgardie, Australia, contractor Arthur Patrick McCormick invented the Coolgardie safe, a primitive evaporation system. His chamber lowered temperatures from the placement of a hemp sack in a tray of water and the evaporation generated by breezes. The absorption of heat from cooling foods enabled outback campers to enjoy chilled perishables.

Industrial Refrigeration

By 1913, Frederick W. Wolf, Jr., a Chicago engineer, adapted a home icebox, the Domelre (*DOMestic ELectric REfrigerator*), to electric power. He sold the machine, with a flexible ice cube tray, for \$900. Leading Chicago meatpackers—Armour, Cudahy, and Swift—adopted cold storage chilled by liquid air, a system that Carl von Linde devised in Munich, Germany, in 1895. The reliable cooling system replaced seasonal livestock shipping and slaughter with year-round production of higher-quality beef, a boon to butcher shops, grocers, hotels, and restaurants. Growers claimed territories—California grapes and lettuce, Florida orange juice, Georgia peaches, Idaho potatoes, North Carolina eggs and pork, Washington State cherries and red Delicious apples, Wisconsin cheese—by supporting rail distribution centers, which carried fresh goods throughout the Western Hemisphere.

In the 1920s, a vitamin craze elevated the value of freshness to eggs, fish, fruit, and meat, a principle ballyhooed in *Ladies' Home Journal* within months after the Spanish influenza scare. To replace toxic anhydrous ammonia, chloromethane, methyl chloride, methyl formate, propane, and sulfur dioxide, Frigidaire compounded Freon, a nonflammable, nontoxic synthetic chlorofluorocarbon (CFC), developed by chemical engineer Thomas Midgley, Jr., of Beaver Falls, Pennsylvania. The shift from dangerous refrigerants proved a selling point to the manufacture of home food coolers and freezers.

The first icebox dealers advertised wood cabinets lined with tin or zinc over layers of sawdust, seaweed, or wood shavings for insulation. A 1922 Kelvinator model contained an ice cube tray; the frost-free heating coil received a patent in 1927. The appliance industry quickly put delivery of ice out of business by mass-producing the ice-making system. Ice makers fought back by claiming to keep fruits crisp, meat moist, and vegetables packed with vitamins. Electric companies answered that ice rises and falls in temperature, keeping citrus fruit, cream, and melons in a state of flux. Aggressive appliance ads and complementary recipe booklets touted aspic and salad molds and a luncheon supply of capers, lettuce, pimiento, and olives as an inducement to children's finick appetites.

At decade's end, with the American diet tilting from grain and red meat to dairy products, fruit, and green vegetables, Postum, the parent company of General Foods, began marketing quick-frozen cherries, fish fillets, meat, oysters, peas, and spinach. The manufacturer chose the cold brine method refined by Clarence Frank Birdseye of Gloucester, Massachusetts, in 1922 for freezing goods at the harvest site. With assistance from the Inuit, Birdseye applied ancient chilling methods to a portable subzero conveyor belt and packaging pressed between icy metal plates. Postum's marketing required the invention of a freezer cabinet to display frozen foods in grocery stores. In 1934, markets began stocking their freezer cases, which enabled house wives to buy fresher foods to keep on hand at home at temperatures from -18 to -35 degrees Fahrenheit (-28 to -37 degrees Celsius).

After World War II, rising home incomes and rural electrification increased business in home refrigerator-freezer models and in commercial refrigerators and ice plants that make dry ice and crushed ice for caterers and shippers. Refrigerators preserved fresh goods in bakeries, hospitals, inns, pubs, raw bars,

restaurants, and soda fountains. In 1949, mechanic Frederick McKinley Jones mounted a chiller on the first refrigerated truck, a more direct transporter of such perishables as blueberries and scallops. The invention required a trailer insulated to sustain dry ice and ventilated to exhaust heat. The ease of delivering fresh produce to local markets or through the mail introduced consumers to world foods as delicate as acai berries and sashimi.

The 1950s confirmed the shift of American tastes toward frozen and refrigerated items. In Peoria, Illinois, in 1954, C.A. Swanson & Sons designer Gerry Thomas engineered the first TV meal, a covered, three-stage dinner for one. A year later, Campbell's Soup bought the Swanson line and augmented frozen inventory to 65 dinners. Two more purchases—Coca-Cola's acquisition of Minute Maid and the H.J. Heinz takeover of Ore-Ida—ensured the availability of popular breakfast juices and frozen french fries.

The discovery of CFCs, still commonly used as refrigerants, in the Earth's atmosphere in 1973 precipitated scientific study of potential damage to ozone in the stratosphere. In 1990, the investigation of an ozone hole over Antarctica increased concerns for the planet's protective mantle. An international treaty, the Montreal Protocol on Substances That Deplete the Ozone Layer, signed by 197 states on September 16, 2009, plans the phaseout of CFCs by 2015 and a recovery of the ozone layer by 2050.

See also: Asian Food Trade; Freeze-Drying; Ice; Marshall, Agnes; Rationing; Trade Routes.

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Regional Cuisine

Regional specialties—the paella of Majorca, black *mole* (sauce) of Oaxaca, corn smut and *nopales* (cactus paddles) of the Comanche and Hopi, noodle soups of Vietnam, and grasshopper and butterfly larva tacos among the Aztec of Mexico City—survive as a testimonial of cooking methods, local beliefs and customs, and the availability of regional foodstuffs. Supply settles practical matters of how and where to find staples, such as pineapple in Hawaii and pecans in the Carolinas. Patagonia, on the southern tip of South America, has access to Antarctic krill and king crab, two contributors to an ample seafood diet. Similarly, the availability of conch and rock lobster influences the seafood menus of the Caribbean much as mussels and sea pie dominate the restaurant offerings in Halifax, Nova Scotia.

Topography and religion impact the gastronomy of specific areas. In central Africa, rampant disease among herds prevents the consumption of milk and cookery with dairy products. Because Hindus revere the cow, regional Indian and Nepalese fare forbids beef dishes and focuses on vegetarian recipes. In contrast, the pastoral Masai of East Africa base their diet on meat, blood, and milk from their herds of cattle. They flavor baby food, beans, corn, and porridge with butter, an essential fat in their recipes.

Historic encounters between peoples alter agriculture and the demand for imported goods, such as cocoa and coconuts. Medieval trade between sub-Saharan Africa and southern Asia permeated age-old African meat dishes with vegetarian curry spices and rice. The two regional agricultures swapped the African mango for the Indian tamarind, generating new possibilities for traditional dishes on two continents.

Similarly, the Muslim conquest of North Africa during the eighth century C.E. introduced Algeria, Egypt, Libya, and Morocco to chickpeas, pilafs, and shish kebab. When Moors from Morocco pressed north into Iberia in 711, they added almonds, aniseed, coriander, eggplant, oranges, and rice to regional agriculture. These ingredients, tinged with Berber accents, boosted area cuisine to include savory and sweet cakes and nougats and the sharing of paella from a communal pot. On their expulsion from Granada in 1492, the Moors took with them an appreciation for fennel and lavender as flavorings and aromatics and the fresh ingredients of Andalusian pepper soup and balsamic vinegar.

After the melding of European and Asian commodities and recipes in the 1300s, long-distance shipping spread coffee and tea worldwide and familiarized global consumers with black pepper, cinnamon, curry, nutmeg, ginger, and turmeric. Christopher Columbus's expedition to the Caribbean in 1492 jolted world cookery with new regional ingredients, introducing the Irish to potatoes, Italians to corn, Spaniards to tomato sauce, and Thai to chili and peanuts. The vegetables regionalized in the sixteenth century added to area cuisine Irish colcannon, Italian polenta, Spanish gazpacho, and Thai chili-peanut dip.

By the early 1900s, with the advent of refrigeration, regional ingredients shipped by air, rail, steamer, or truck earned global respect—for example, the acai berries of Belize, Barbadian flying fish, Costa Rican chayote, durum wheat from Italy, Swedish lutefisk, and red snapper caught off Veracruz, Mexico. Samplings of traditional dishes created diversity in dining, engendering enthusiasm for Cantonese dim sum, English cider, German sauerbraten, Indian ghee (clarified butter) and naan (flatbread), Mongolian hot pots, and Thai spring rolls. Although consumers broadened their experience with unfamiliar aromas, flavors, and textures, their regional dishes continued to flourish as comfort food and ritual servings indigenous to their foodways.

See also: Local Food Movement; Mediterranean Diet and Cuisine; Randolph, Mary.

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[Religion and Food](#)

From prehistory, acknowledgement of the powers of nature influenced the devout to propitiate deity with food offerings. Suppliants shared meals as a token of civility and piety, such as the communal dinners the Essenes consumed at Qumran (in today's West Bank). To worshippers, sacred food, an essential of most religions, represented sustenance from nature, a divine gift. At the pan-Hellenic presentation of *theoxenia* (god welcome) at Delphi, families spread whole meals before a divinity at a sacred table as models of wholehearted thanks to the guest god. To connect sustenance with celebration, groups reserved the suckling pig for Chinese weddings and served cabbage and brisket for St. Patrick's Day, kegs of beer for Polish holidays, lamb for Easter, pancakes for Shrove Tuesday, champagne for New Year's Eve, bitter herbs and roasted eggs for the Passover seder, pumpkins for Halloween, dates on Eidal-Fitr, turkey for Thanksgiving, and eggnog and fruitcake for Christmas.

From an ascetic perspective, the Buddhists and Jains of India originated food taboos to challenge Hinduism by pioneering vegetarianism, a cuisine "innocent" of animal slaughter. Sikhs perpetuated the assault on established foodways by proscribing alcohol and tobacco. Currently, Mormons carry asceticism to greater lengths by rejecting alcohol as well as stimulants, including coffee and tea.

In Western thought, food consumption reflected the status of human mores and behavior. The Greeks treasured myths of Dionysus, the god of wine, who wandered the earth in disguise and shared meals with the humble. Both Greeks and Romans worshipped Apollo, the god of light, with bean feasts, an homage to the procreative power of humble vegetables also found among Celts at Beltane, with a fertility rite held on May Day. Roman households paused after *cena*, the evening meal, and before dessert to offer salt, wheat, and wine on the altar of the *lares* (house gods) and *penates* (pantry deities). At the house of Pansa in Pompeii, a kitchen painting features images of a hare, a boa constrictor's head, game birds, a string of fish, loaves, and an onion, illustrations of standard food sacrifices. Similarly, the devout Hindu of India observed hearth protocols calling for the casting of portions of each dish into the cooking fire along with the recitation of prayers to the gods and ancestors.

Food and Earth Gifts

In the New World, the worship styles of first peoples manifested awe at the availability of foods in nature, particularly acorns, buffalo, corn, seals, and whales. In Mesoamerica, the Maya ground cacao beans with chili, cornmeal, and honey to make *xocolatl*, a chocolate drink sipped by the elite and presented as a ritual altar gift. The Lakota valued pemmican mixed with berries as a communion dish for the Horn Society, a prestigious warrior brotherhood. For the Sun Dance, participants consumed boiled buffalo tongue. Before passing the sacred pipe at the All Smoking ceremony, participants thickened blood soup with cornmeal, a somber blending of animal with grain bestowed by the Earth Mother.



A Russian Orthodox priest sprinkles Easter cakes and eggs with holy water at a city near Moscow. On Holy Saturday, the devout spread a ritual table with three meats representing the Trinity and eggs symbolizing rebirth. The meal lasts until Easter Monday. (*Ivan Sekretarev/Associated Press*)

Typically, thanksgiving gifts take the form of first fruits, such as the raw foods presented to Polynesian gods at Bellona in the Marshall Islands and the luau in the Hawaiian Islands. Taking an inclusive approach to gratitude, the Greek Anthesteria festival dish *panspermia*, a midwinter supper of mixed seeds,

represented the mystery of germination and the magic of human nourishment. In China, traditionally, each family honored the kitchen god at the hearth mantel, where they offered sweet cakes of sticky rice shaped like lotus root and taffy molded in the form of melons. The veneration of roots and seeds propitiated good luck in the coming months from above and below ground. In more complex altar offerings, processed food could be liquid, as in a cup of milk or vintage wine; or cooked or preserved dishes, such as cake, cheese, consecrated bread, preserved or salt meat; or sweets, such as sticky rice cake stuffed with bean paste that the Vietnamese eat to celebrate Tet, a New Year's holiday. In North Carolina in 1727, Moravians at Salem held their first love feast, a gesture to fellowship. Women distributed simple servings of hot coffee and paper-thin spice cookies, a tradition still honored throughout the Piedmont. In the past half century, the Kwanzaa table has reverted to raw foods by displaying garden fruits and vegetables, a celebration of Swahili values that evolved in the 1960s during a pan-African movement.

More controversial ritual calls for animal sacrifice, a focal observance among Santerians with the beheading of goats and roosters. In Genesis, Abraham, the Hebrew patriarch, honored Yahweh by first preparing his son Isaac for child sacrifice, then accepting the gift of a ram, interpreted by Christian theologians as a foreshadowing of God's intervention in human sorrow through Jesus's sacrifice. The Aztec outraged conquistador Hernán de Cortés by blending the blood of sacrificial adults and children in sacramental drink and food, along with hearth ash and pulverized bones as tokens of human suffering. In Palestine, by burning gifts of grain, meat from an unblemished animal, and oil with incense, the devout propitiated the gods with smoke and pleasing aromas, which rose to heaven. A welcome altar meal might procure an earthly request, such as victory in battle, success in business, or forgiveness and salvation in the afterlife.

Holy Beverages

Holy drinks took on spiritual and emotional meaning after brewers turned simple liquid into ritual intoxicants, magical sources of spiritual cleansing and regeneration. Persian Zoroastrians and the devout of Aryan India elevated to

godly elixir the beverage soma, a mysterious liquid that may have derived from the stalk of *Ephedra sinica*, a species of shrub. Soma makers pressed the juice and drank it fresh at ritual events honoring the god Indra, the Hindu lord of heaven. Much of the Rigveda (Praise Stanzas, ca. 1200 B.C.E.) lauded soma as a libation prepared to revere human and animal procreation. With parallel enthusiasm, Greek imbibers revered wine-generated giddiness as an internalization of the god Dionysus, a life giver whose worship inspired the drinkers of heady cupfuls to don masks, chant dithyrambs (hymns), and create drama. In like fashion, the Khanty, seminomadic reindeer herders of the Russian tundra, prayed to the invisible beings of their tepee before tossing a mug of vodka into the cookstove. The explosion of alcohol in the chamber communicated with animistic spirits of heavenly bodies, forests, rivers, trees, and animals.

In Japan, a sacred beverage evolved after the accidental fermentation of rice before 200 B.C.E. Sake became a religious icon and a cultural symbol of welcome and conviviality. Brewers created it primarily for the emperor's table and for monks and priests to use as gifts to the *kami* (nature gods), in street processions, and in rituals performed at Shinto temples and shrines. Although it became a secular drink manufactured for sale and trade during the early 1100s, rice wine retained its centrality in folk customs, especially weddings. Bride and groom drank sake from lacquered cups as symbols of unity and the home. In addition to supplying the family table with a staple cereal, rice initiated observance of two national thanksgivings, Kan-name-sai and Nii-name-sai.

Sacramental drinks carried a similar panache in the pre-Columbian Americas. According to Franciscan historian and ethnologist Bernardino de Sahagún's encyclopedia, the 12-book *Historia General de las Cosas de Nueva España* (*General History of the Things of New Spain*, 1540-1569), native Mexicans conducted ceremonial feedings of their pagan gods with tamales and a stew of dog or poultry. Alongside plates, they burned incense in clay containers and sang and drank *pulque*, the fermented sap of the maguey plant. The drink also honored their deities and poor relatives on All Saints' Day, a syncretic feast that Mesoamericans still observe from October 31 through November 2. Farther south, tribes along the Amazon as far west as the Andes Mountains cut alkaloid tendrils for boiling or pressing to obtain *ayahuasca* (spirit vine). A hallucinogen and vermifuge, ayahuasca empowered a native sacrament, particularly for coming-of-

age rituals and vision ceremonies treating addiction and depression.

Sacred Cooking

Kitchen workers have traditionally worshipped deities connected with living plants and animals that comprised major sources of food, such as the Hopi and Mandan corn gods and the ser vice of a holy broth made from clam stock and brown kelp to esteem the Korean mother after childbirth. From early times, the Inuit of Greenland and Baffin Island interrupted their chopping and cooking of seal and whale carcasses to sing and praise the spirits of nature. To ward off evil spirits, in China, Bai villagers tossed bread with coins baked inside from the roof and smeared cock's blood on a kitchen post. The placement of a crucifix in the kitchen of a Christian home or the "eye of God" over the kitchen door in a Turkish Islamic house hold indicates the cook's reliance on a supreme being to nurture and protect the family. To house hold deities of the Shinto faith, the Japanese made regular offerings at the *Kami-dana* (altar) of steamed rice and rice balls topped with diced lotus bulb and sesame seed and coated with bean paste. Shinto temples contained their own kitchens for the ritual preparation of sweetmeats and festival foods and for meals served to pilgrims.

In perversions of sacred cooking, some worshippers slaughtered nonbelievers, who died like animals sacrificed for the altar. Roasting was a diabolical battlefield punishment for Placidus, an apocryphal second-century C.E. Roman general and captain of the imperial guard. After Placidus and his wife Tatiana converted to Christianity in the time of the Emperor Trajan, he altered his name to Eustachius, and she took the baptismal name Theopista. At a victory celebration in 118 C.E. under Hadrian, Trajan's successor, the general refused to participate in a sacrifice to Rome's gods. When his troops retaliated, they confined Eustachius, Theopista, and their sons Agapius and Theopistus in a brass bull and cooked them alive. Although he became St. Eustace, the patron of hunters, artists depicted him with a cross, stag, and oven in token of his martyrdom.

The act of cooking took on holy overtones among the ancient Inca of Cuzco, Peru. The raising of domestic meat for religious use focused on dogs. After the Spanish conquest, mestizo chronicler Garcilaso de la Vega compiled *Comentarios*

Reales de los Incas (*The Royal Commentaries of the Incas*, 1609–1617), which summarized native behaviors from an aboriginal point of view. He spoke of his people's rivals, the Huanca of the Xauxa River valley at Lima, who worshipped dogs, which native cooks raised, fattened, and sacrificed at ritual feasts. In the capital city, natives honored the sun god by burning food at the temple and pouring *chicha* (corn beer) into a holy fountain. The most sacred precinct in Cuzco, the House of Chosen Women, held huge corncribs from which the emperor drew food for holiday banquets. To supply the gods' kitchen, religious authorities selected eight girls aged 13 or 14 on the basis of beauty, health, and unspotted lineage to be invested as the "Brides of the Sun." Like the Vestal Virgins who kindled the sacred hearth fires of ancient Rome, the Peruvian maidens lived in houses of the elect at the shrine at Pachacámac and studied ritual and holy bread making under chosen women, stately, virginal matrons who had once been the sun's mates before becoming priestesses. As the girls excelled, some advanced from kitchen work to become royal brides or noble house keepers.

Fasting and Feasting

Unlike atavistic religions, Christian philosophy tended toward exoneration for human weakness through asceticism. Although the church evolved no uniform core of fasting and diet, theologians advocated vegetarianism because of an aversion to the physical implications of meat, a product of animal coition and bloodletting. In the third century C.E., the polemicist Tertullian's *De Jejunio Adversus Psychicos* (*On Fasting*) enlarged on the gospel of Mark 9:29, in which Christ states that healing power derives from prayer and fasting. In the early seventh century, St. Isidore of Seville, the "schoolmaster of the Middle Ages," imbued abstention from the table with religiosity and morality by sanctifying the ritual fast as holy self-control. Basing his dietary philosophy on the four humors, he charged red meat consumption with goading the weak to carnal lust and lechery. From his exhortation, theologians devised calendars of fasting that called for abstinence from meat at Advent, Lent, Epiphany, and Pentecost. To preface the self-abnegation of 40 days of Lent, Christians invented Carnival, a sybaritic

glutton fest heightened by carnality and merriment. Late in the era, the pious abstained from eggs and meat during the entire 40 days preceding Easter. The end of this prolonged fast culminated in a blessing of eggs on Good Saturday before Easter, the beginning of the custom of dyeing Easter eggs, a symbol of regenerated life.

For Christians, the holiest ritual, the Eucharist, generates intimacy with the almighty through participation in a sacrament mimicking Jesus's last supper with his disciples. The taking of communion involves a symbolic re-creation of Jesus's pre-crucifixion meal. The Christian Eucharist employed horn vessels until 785 C.E., when the Catholic Church forbade preparers to serve ceremonial wine in horn cups to accompany holy bread. King Aelfric clarified the order in 975 by specifying wood as a less pagan material for ritual chalices. After William the Conqueror took Britain from the Anglo-Saxons in 1066, Norman lords retained the early horn drinking vessels for ritual use and reengineered them with silver mounts and feet so they would stand on an altar. The quibble reignited in 1071, when priests at Winchester determined that wood committed a sacrilege by absorbing wine, which, by the principle of transubstantiation, became the blood of Christ. King Richard I further muddied the issue in 1175 by demanding that only gold and silver should convey communion wine, thus placing a burden on poorer religious communities better able to supply their altars with horn or wood containers.

Variants of communion service invested different branches of Christianity, such as temperance fundamentalists, who substituted grape juice for wine, and holistic observers of Maundy Thursday, who passed whole loaves for each partaker to pinch off one bite. After the conquest of Mexico, Spanish priests supervised the planting of wheat to provide bread for the Eucharist. While their overlords raised wheat wafers for the priestly blessing, Mexica converts continued to celebrate communion with tortillas, a syncretic token of reverence to ancient corn deities. In May 1750, at a Greek Orthodox Eucharist in Anatolia, Swedish ethnobotanist Johan Hasselquist witnessed a bishop breaking small wheat cakes and distributing pieces mixed with wine in a common chalice before the ritual washing of feet. In the late 1800s, Protestants channeled discontent with orthodox strictures by replacing the communal chalice with individual cups.

Orthodox Food Service

Medieval issues of purity questioned the readiness of both body and spirit and influenced the thoughts, words, and prayers of the pious. In Syria, Muslim women set dinner tables only in the evenings, when families mingled with friends. To accommodate night dining, men closed shops and businesses early and offered portions to beggars in obedience to Islamic injunctions to succor the poor.

In Great Britain, on a long trek of the Celtic highlands and islands, anthologist Alexander Carmichael compiled Gaelic auguries, charms, hymns, incantations, omens, prayers, and table rituals for the *Carmina Gadelica (Gaelic Hymns, 1900)*, which his family completed after his death. Among the verses, he included a humble Scottish runic chant, "The Blessing of the Kindling." As the fire maker bent to the daily domestic ritual, she felt herself in the presence of the angels Ariel and Uriel. In otherworldly company as she began meal preparation, she emptied her spirit of negatives and served God by lighting the hearth and asking God to kindle her heart with love. Celtic peasants looked upon fire as a divine miracle that warmed the body and cooked food. The fire became an emblem of need and reminded them that they, too, needed constant mental and physical nourishment.

Other parts of the world have established a tradition of reverence to the gods through home-cooked delicacies. In Soka, Bali, throughout the process of growing food for the table, farmers propitiated Dewi Sri, the rice goddess, with gifts of eggs, grain, palm leaves, and flowers raised alongside their fields. Among the Maya of Yucatán, into the mid-twentieth century, a Chachaac ceremony called for gifts of ground corn and squash seeds from house wives to Chaac, the rain god. At the altar, gourd bowls hung from an arch or lay on beds of *chimché* leaves. Men complemented the womanly offerings by making *zacá*, a sacred drink fermented from corn and water. Among fisherfolk in Kuzaki, on Enshu Bay east of Osaka, offerings of seafood required a special preparation of the abalone catch. One ancient rite called for the excision of the circular abalone muscle in an unbroken strip. The cook sun-dried the muscle, then divided it and tied it with rice straw for home use.

See also: Afterlife and Food; Charlemagne; Cussy, Louis, Marquis de; Halal; Holiday Dishes and Festival Foods; Ibn Battuta; Kosher Food; McDonald's; Medieval Diet and Cuisine; Peyote; Polo, Marco; Pork; Poultry; Shellfish; Sicilian Diet and Cuisine; Water; Yeast.

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Restaurants

The popularity of restaurant cuisine generated a distinctive strain of commercial on-premises dining that paralleled the rise of the middle class.

Cookshops flourished from ancient times, including caravanserais (inns) from 1500 B.C.E. across the Fertile Crescent, the *thermopolia* (hot food counters) of Rome, and the street vendors of Aztec Mesoamerica. From 960 C.E., Chinese tea houses encouraged a pleasant atmosphere by providing patrons with dishes of finger food and pots of tea. In the 1300s, Chungking (Chongqing) hot pots lured Chinese diners to small cafés and street stalls for a one-dish meal. Kyoto's first restaurant, the Nakamura-ro, opened in the Gion District in 1575 with a short menu— egg miso and charcoal-broiled tofu.

In the late 1600s, caterers in England and France varied ingredients by plating a single option, salmagundi, an eye-catching arrangement of eggs, fish, greens, and meat topped with dressing and spices. Similarly limited in choices, the *table d'hôte* style of food service set a time and fixed menu, a benefit to travelers and

to people who ate out daily.

In 1723, Simpson's Fish Dinner House, a famed London chop house in Beil Alley, Cheapside, charged 2 shillings each for a dependable spread of cheese, mutton, oysters, partridge, and soup, served promptly at 1 P.M. following a brief table blessing. In view of the Thames, patrons paid one price to sit communally at a long table, share platters and covered dishes, and sip punch for 1 shilling per glass. A less filling menu at the Caffè Florian in Piazza San Marco, Venice, which opened in 1720, offered finger food and pastries to accompany coffee and tea. An elegant setting for artists and writers, the restaurant drew the patronage of Giacomo Casanova, Charles Dickens, Robert Browning, Goethe, Gertrude Stein, Richard Wagner, and Lord Byron.

Eighteenth Century

In 1765 in the heart of Paris, wine dealer A. Boulanger served bouillon and *pot-au-feu* at the first Western restaurant, a business devoted entirely to full meals. He called his brasserie a *restaurant* (restoring), a distributor of *restoratifs*, hearty meat soups. After the collapse of the Bourbon dynasty during the French Revolution in 1789, the democratized nouveau riche sought refined commercial meals rather than hire cooks and servants for in-home cuisine. Historians refer to the fad for table service as *manie des dîners* (dinner mania), a public craze for quiet assignations and such romantic entrées for two as chateaubriand, a thick cut of tenderloin in a white wine sauce. Similar establishments in Berlin, London, and New York City catered to the elite with menus typically written in French and featuring set prices.

The vogue for dining out or hiring caterers inspired chef Marie-Antoine Carême's development of gourmet dishes, sauces, and pastries for restaurants in London, Paris, and Vienna. The first food critic, Alexandre Laurent Grimod de la Reynière, issued *L'Almanach des Gourmands* (*The Food Fancier's Almanac*, 1803–1812), a survey of Paris bistros and cuisine itineraries of the city's neighborhoods. Grimod's critiques highlighted the ethos of gastronomy. He celebrated the spectacle of food presentation and the drama of dining room conduct, from oyster appetizers to veal entrées and lark-filled pastries. In evaluating the standards of

the Napoleonic era, he stressed the value of good cooking, which he praised in the kitchens of Le Gacque and Madame Véry.

Europe developed Anglo-Indian eateries that specialized in chutney and curry, imports from the British Empire. The spicy fare spread to English establishments in Antigua, Barbados, Guyana, Jamaica, Tobago, and Trinidad. In France, Monte Carlo, and Switzerland, Georges Auguste Escoffier, the “Father of Modern French Cuisine,” built the reputation of haute cuisine and the notoriety of the celebrity chef. Contributing to the allure of grand entrées, upscale tableware and professional wait staff enhanced the diner’s enjoyment of individualized service. In 1875, the first vegetarian restaurant opened in Leipzig, Germany, featuring meatless curry and ragout.

North American Venues

In North America, stagecoach stops and oyster houses offered the first restaurant business model. From 1762, the Fraunces Tavern on Pearl Street in New York City welcomed influential patriots, notably the Sons of Liberty, General George Washington, and officers of the Continental Army. Waves of immigration in Canada and the United States introduced consumers to inexpensive idiocuisine—Japanese udon, Jamaican jerk chicken, Czech sausage, Scandinavian pickled herring, Greek spinach pie, German stollen, and Mexican churros. Delis compromised on expensive restaurant ambience by offering tables for consumers selecting salads, cheeses, and cold cuts from the counter. Cafeterias emphasized tray service from a variety of dishes ladled from steam tables.

Coastal restaurants developed specialties—lobster and crab sandwiches in Nova Scotia, clam chowder in Maine, and salt-and-pepper flounder on the coastal Carolinas. Plains inns offered cider and prairie chicken as well as the most recent game. Frontier cooks broiled and fried buffalo steaks, roasted ribs, and baked the nose and tongue. In New Orleans’s French Quarter, from 1840, Antoine’s specialized in bouillabaisse and lobster bisque and originated Oysters Rockefeller; Galatoire’s served oyster cocktails, Crab Ravigote, and foie gras, a reminder of the city’s French roots.

In Manhattan’s Madison Square, Charles Ranhofer, a French chef from Saint-

Denis, popularized Delmonico's Restaurant. He incorporated artichokes, avocados, eggplant, and endive into an 11-page menu and created iced and dairy treats to satisfy the tastes of the Gilded Age. His menu offered vintage wines from a cellar holding 16,000 bottles. His two-volume book *The Epicurean* (1894) surveyed an era of fine dining on capon, thrush, pike turtle, and young rabbit.

In 1849, Norman Asing opened Macao and Woosung, the nation's first Chinese restaurant, in San Francisco's Chinatown. At an all-you-can-eat buffet, police and politicians met to discuss the volatile atmosphere caused by the California gold rush and subsequent anti-Asian unrest. The city developed an eclectic mix of restaurants, including German, Italian, Japanese, and Spanish fare. California's *Overland Review* incorporated the restaurant introduction among political commentary and literary critiques.



Delmonico's steak house in New York City, seen here at its 1903 midtown location, opened in 1837. The namesake of the Delmonico steak, it claims to be "America's first fine dining restaurant" and the first eatery to offer an à la carte menu and wine list. (*Library of Congress*)

Travelers' Eateries

During the importation of Chinese laborers to build the transcontinental railroad in the mid-1800s, Cantonese dim sum eateries sprang up along the Union Pacific track from California to Missouri. In 1868, Pullman cars replicated restaurant table service with servings of caviar, filet mignon, and champagne; at Santa Fe Railroad stops, Frederick Henry Harvey opened a chain of road food eateries called Harvey Houses, which featured a breakfast of calf's liver, beef hash, mackerel, and trout. In 1898, North American exporters on the Pacific Coast shipped fresh beef from Kansas and Texas to Hawaii, Hong Kong, and the Philippines for serving at inns and restaurants, where demand boosted ranchers' profits. During World War I, when suppliers turned their attention to military needs, New York restaurants coped with beef shortages by replacing it with fish in appetizers and stews.

In imitation of rising restaurant standards, the Venice Simplon-Orient-Express added an upscale restaurant car offering petite vegetables in butter sauce, medallions of roast beef in *bordelaise* sauce, and a cheese tray. Cruise lines profited from à la carte dining of such exotica as prime game, champagne, and flambéed desserts. Into the mid-twentieth century, Michelin Guides awarded stars to the restaurants of luxury hotels catering to travelers and gourmards, such as the Majorcan tourist retreats featuring French *rôtis* and Spanish paello.

At the other end of the economic spectrum, post-World War I diners set up kitchens in recycled trolley cars, the source of Henry Perry's Kansas City barbecue and rib eatery, an early black-owned food business. A family-minded restaurant trade favored the Howard Johnson chain, which featured clam strips and HoJo's ice cream after its debut in Quincy, Massachusetts. During the Great Depression, restaurant managers survived by abandoning pretentious French terms on menus—*au gratin*, *pamplermousse*, *fricassée*, *pomme de terre*, *potage*, *ragoût*—and by offering simpler soul food specials, such as chicken pot pie and black-eyed peas and ham hock.

The end of Prohibition in 1933 returned patrons to leisurely dining in restaurants serving cocktails and wine. Poorer consumers supported neighborhood alehouses and lunchrooms and, in 1936, the first drivethrough, which opened in Glendale, California. In the late 1940s, fast-food diners and steak

houses threatened the profitability of chain and owner-operated restaurants. Convenience dining on burgers and pizza replaced the relaxed consumption of multicourse meals and the savoring of after-dinner wine and mixed drinks.

Healthful Food

The local food movement, an offshoot of faddish veganism, offered chefs a year-round supply of salad greens and summer vegetables from greenhouses, a boon to the menu of the Four Seasons, one of New York City's top-rated landmarks. The baroque offerings ranged from sturgeon and wild mallard to woodcock and suckling pig. Food writer Craig Claiborne promoted dining out in the late 1950s with the restaurant reviews he composed for *The New York Times*. Contributing to the resurgence of traditional Gallic fare and to the notoriety of chef Jacques Pepin, clientele at New York's La Côte Basque and Le Pavillon dined regally on mousse de sole, sweetbreads meunière, and jellied ham. Glamorous guests—Joseph P. Kennedy, the Duchess of Windsor, and Igor Stravinsky—tended to pose in mid-meal in photo sections of society pages.

In the same era as the epicurean delights at the Forum of the Twelve Caesars in New York City, the fusion cuisine of Tex-Mex restaurants of the 1960s ventured away from traditional Mesoamerican fare by adding fajitas, nachos, and low-calorie taco salads to menus. Into the 1970s, butter and cream returned to favor after food maven Julia Child's lectures, televised kitchen demonstrations, and books generated enthusiasm for fine French dining.

At the end of the Vietnam War, Asian family-style restaurants in large cities popularized sushi, chai tea, fish sauce, Korean barbecued ribs, and pad thai. The competition and health consciousness, along with publication of Morgan Spurlock's exposé *Super Size Me* (2004), forced restaurateurs to intersperse extensive veal and pork offerings with more healthful offerings, such as mahimahi and salmon. Menus coded choices with symbols for "heart healthy," "no trans fat," "organic," and "neo soul food," a rethinking of cholesterol-burdened dishes featuring pork fat. The appeal of lighter menus wooed more stay-at-homes into the commercial food marketplace.

Total U.S. expenditures on commercial dining topped \$475 billion in 2005,

when chefs vied for customers by advertising innovative dishes and a relaxed atmosphere. In 2009, citizens averaged five restaurant meals per week. Mall dining, which combined with movies and shopping to draw patrons, elevated Applebee's and other chains to a global phenomenon. As of 2010, Americans spent some 53 percent of their food budget on away-from-home food.

Currently, travel and tourism undergird the success of many bistros and restaurants worldwide. Evidence of the staying power of historical cuisine survives in Nakamura-ro, which has fed patrons in Kyoto, Japan, for nearly 450 years; Venice's Caffè Florian, still in business since 1720; and the Fraunces Tavern, a New York landmark where George Washington ate pub grub. Tony urban restaurants in Algiers, Brussels, Guangzhou, Lima, Montreal, Nairobi, and Washington, D.C., offer an artisanal mélange of chapati, *koushari*, miso soup, smoked or sun-dried fish and game, wild greens and berries as side dishes, and cappuccino and espresso with beignets.

By 2012, trends toward online reservations, gift cards, longer dining room hours, and curbside pickup had boosted the American dining trade despite flat consumer spending overall. Restaurants tend to modify innovation with niches for hamburgers, vegetable beef soup, and macaroni and cheese, standard comfort foods. Television demonstrations on the Food Network encourage cooks to imitate restaurant specialties with ingredients purchased locally or from online gourmet shops selling coffee and tea, herbs, spices, and specialty foods.

See also: Cooking Schools; Fusion Cuisine; Gourmet Cuisine; McDonald's; Nouvelle Cuisine; Prohibition; Salad and Salad Bars; Shellfish; Travel Food.

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Rice

For 20 percent of the world's population, traditional rice entrées, congees (gruel), condiments, sweets, pickles, popped snacks, tonics, vinegar, beer, and wine form much of the week's menus. A wild grain appealing to hunter-gatherers around 18,000 B.C.E., rice became Asia's first cultivated crop. For centuries, domesticated stands thrived at the edges of ponds and in paddies flooded 4 inches (10 centimeters) deep, beginning in the Yangtze River region of China in 9500 B.C.E. and in Vietnam after 9000 B.C.E. Varieties in southern China's "rice region" fed the residents of Guangdong, Hunan, Fujian, Jiangxi, and other provinces.

An aquatic people first sowed the grain from 5000 B.C.E. Cooks of the Hemudu and Majiabang cultures around Hangzhou Bay in China served the high-energy grain. Rice balanced nutrition and the textures of vegetables and the meat of frogs, deer, dogs, pigs, and stuffed fowl. Easily stored and digested, the grain absorbed the flavors and aromas of herbs and spices, thus promoting gastronomic innovation.

Japanese and Koreans contoured rice paddies from 3500 B.C.E.; Thai rice plantations existed as early as 3000 B.C.E., contemporaneous with tomb art in Thebes picturing rice husking in Egypt. Defying poor soil, nematodes, and difficult climate conditions, African "black rice" (*Oryza glaberrima*) covered fields of the upper Niger River valley from 1500 B.C.E. In India, rice entered scripture in the Sanskrit text Yajurveda (1400 B.C.E.) and centered birth and death rituals as evidence of the grain's significance to longevity.

For aboriginal North Americans, wild rice (*Zizania palustris*), a separate species from the predominant *Oryza sativa*, dated into prehistory as the famine food of the Great Lakes Ojibwa. Chinese varieties of wild rice once flourished around 1050 B.C.E. in the Yangtze River basin, Manchuria, Korea, Annam, and Malaya as a grain and a stem steamed like bamboo shoots for slicing into stir-fries.

Technology and Production

Iron tools and plow animals, introduced to rice cultivation after 722 B.C.E., eased the labor-intensive rice season. In the 500s B.C.E., hydraulic engineering through dikes and gates offered control of river and canal irrigation and precipitation runoff. In Sri Lanka after 540 B.C.E., Indio-Aryan farmers introduced dryland rice farming and centered their cuisine on their crops. Grain dealers exported surplus harvests from southern Asia to the outside world. The yield multiplied in southern China after Indian and Indochinese rice varieties added new cultivars suited to flooding and saline soil. In the lowlands, such natural hybrids as deep-water, drought-resistant, semidwarf, and upland cultivars increased varieties to 40,000.

Around 200 C.E., Chinese texts described the production and use of two types of grains, dry and sticky, by the laborious method of transplanting seedlings in mucky puddles. Quick-ripening hybrids and double cropping supported the dense urban populations that developed south of the Yangtze River after 1250, about the same time that the Moors cultivated African *glaberrima* in Iberia. To ensure a productive habitat, Chinese farmers rented ducks to devour insects and weeds.

During the Renaissance, rice traveled by voyagers to the Volga River valley, Yemen, Sicily, Majorca, and Lombardy and served as the foundation of sweet desserts mixed with egg custard and fruit. The Spanish introduced rice seed in the 1520s at Veracruz, Mexico, where chefs added the grains to fish and shrimp entrées. In 1562, Portuguese navigators bought *glaberrima* seed from Arabs and female traders in Sierra Leone and spread rice culture to the Maranhão plantations of Bahia, Brazil. Marketers sold their grain in Rio de Janeiro, where cooks developed rice salads and vegetarian dishes from combinations with onion and tomatoes.

North America produced its first *sativa* cultivar, Carolina White, in 1686 after Henry Woodward of Johns Island, South Carolina, experimented with a small planting that yielded the world's finest seed. In the late 1600s, enslaved Mandinka cultivators imported from rural Gambia, Guinea, and Senegal recipes for rice and beans. The combination influenced the coconut-flavored Costa Rican dish known as *gallo pinto* (spotted rooster) and the hoppin' John of coastal South Carolina, Georgia, and Louisiana Creole cuisine. Venezuelans turned the one-pot meal into

their national dish.

[Recipe: Hoppin' John](#)

In a large pot, fry four strips of bacon; crumble after frying. To the bacon and fat, add three bay leaves, 2 teaspoons of red pepper flakes, and one each of chopped green pepper and onion. Add 1 quart of water, two smoked ham hocks, and 1/4 pound of dried black beans or black-eyed peas. Bring the mixture to a boil and simmer for one hour. Add 1 cup of brown or white rice, 1/4 teaspoon of cayenne pepper, and sea salt to taste. Simmer for 30 minutes. Serve with chowchow or piccalilli.

England's rice trade relied on the Carolina crop and imports from Bengal and Madras until 1852, when the British Empire annexed Burma and its fertile paddies. More cultivars diversified U.S. rice crops in 1890 and 1899 with the introduction of the Honduras and Japanese strains. The U.S. Department of Agriculture set up experimental crop improvement programs, which spread rice cultivation to Arkansas, Louisiana, Texas, and California. In the late 1930s, farmers in Florida, Missouri, and Mississippi added stations for monitoring gene segregation and recombination. Technology improved the pearling, or polishing, of grains to create an even white product.

Feeding the World

After World War II, China devoted 25 percent of its tilled land to rice, producing 20 times the harvest of the United States. India's Andhra Pradesh region, the nation's rice bowl, expended 77 percent of cropland on paddies. While Americans devoted 38 percent of their diet to cereals and legumes and 21 percent to eggs and meat, the intake of rural Chinese rose to 88 percent grain and only 3 percent eggs and meat. Residents of Fujian Province, with the best supplies of grain, ate rice at every meal; adult males consumed up to 485 pounds (220 kilograms) each per year. In India and Indonesia, the Green Revolution of the 1940s–1970s produced

“miracle rice,” a semidwarf cultivar that permits three annual plantings.

Today, 95 countries around the world produce rice. While consumption has been lapsing in Japan, it is burgeoning overall from exports of Madagascar’s long- and large-grain rice, from increased harvests of glutinous rice from the Mekong River valley of Vietnam, and, outside Milan, Italy, from the traditional consumption of arborio varieties, the source of risotto dishes. Thai farmers hedge the ups and downs of commodities marketing by growing jasmine rice, a high-quality fragrant grain that earns twice the profits of ordinary species. Other markets in Hong Kong, North Africa, and the Pacific islands show potential for growth in the world’s rice output.

The crossbreeding of rice seeds by the International Rice Research Institute in Indonesia, Nepal, the Philippines, and Southeast Asia aims at producing a perennial cultivar that can withstand blast fungus, drought, and flooding. Success in Guinea raised the annual yield by 30 percent, a boost to nutrition and a substantial shield against famine. Hopes for New Rice for Africa (NERICA) arise from agronomist Monty Jones’s propagation of a hardy, high-protein seed from common *sativa* rice and African *glaberrima* rice.

See also: Amerindian Diet; Cantonese Diet and Cuisine; Irrigation; Japanese Diet and Cuisine; Persian Diet and Cuisine; Szechuan Diet and Cuisine.

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[Roman Diet and Cuisine, Ancient](#)

From its rise from a pastoral culture to an international superpower, ancient Rome advanced in quality and variety of cuisine and in attention to nutrition. Systems of dietetics offered a source of health and fitness as well as a denotation of social class. While country folk kept to a daily regimen of meatless dishes of chickpeas, garlic cheeses, lentils, and vegetable soups, herders lived most of the year on stone-ground barley loaves soaked in milk or wine. Male enclaves offered the occasional wild boar's head, a center of hunting party feasts, plated and adorned with leaves and herbs. Ligurians specialized in baking flatbread, the ancestor of focaccia; Lucania, home to the poet Horace, developed game recipes and sausage making; Calabrians added grape hyacinth bulbs and lupin seeds as recipe flavorings; Lombards gained fame for crisp apples, cherries, and cole vegetables and for fermenting lake fish.

On the march, legionaries made do on barley mush, the forerunner of orzo pasta, or *farinata*, a gruel of wheat flour and water flavored with fat. They carried their own mortars and rations and took charge of the day's cooking. A cold beverage, *posca*, began with the dilution of sour wine or vinegar with water topped with a sprinkle of herbs. Combat casualties received their nourishment in barley water, a sweetened tonic.



In the homes of wealthy ancient Romans, the kitchen—depicted here in 100 C.E.—was a center of activity.

Clay ovens baked wheat breads and barley cakes. Amphorae stored essential grains and liquids, as well as exotica from around the empire. (*The Granger Collection, New York*)

As Rome grew into a metropolis, city dwellers relegated more of their food preparation to others, especially laborers at the salt pits that flourished after 200 B.C.E. At outdoor markets, kitchen slaves chose the freshest supplies of artichokes, asparagus, cabbage, endive, lettuce, mint, nasturtiums, and parsley and picked over baskets of root and row crops—beets, cucumbers, elecampane, garlic, gourds, leeks, onions, parsnips, radishes, skirrets, and turnips. Busy urbanites and visitors patronized street vendors and *tavernae*, fast-food counters and wine bars. Along with gambling and prostitution, these food marts offered bowls of blood pudding, fish skins, flatbread cooked over domed clay pots, honeyed omelettes, hot offal and sausages, mulled wine, salted chickpeas and turnips, and wheat pancakes. Holiday cuisine called for the crushing of walnuts with sesame seeds and soaking this mix in honey. Savvy wives offered overeaters sips of walnut *digestivo*, a liqueur taken to settle the stomach, purge and soothe the intestinal tract, and ward off anemia. Wisely, nine days after a funeral, mourners spared the dead similar bellyaches by leaving bowls of broad beans and chickpeas at gravesites.

Dining Patterns

Daily meals began with a light *ientaculum* (breakfast) of bread, cheese, dried fruit, and olives. Multiple courses at *cena*, the main meal at midday, preceded *vesperna* (evening meal) in the city or, in the country, *merenda* (light supper), for which male and female diners convened and sat on chairs at a communal table. By the time of Julius Caesar, around 50 B.C.E., *prandium* (lunch) offered a spread of hot and cold dishes served simultaneously rather than in formal courses. For recipe preparation, chefs stocked processed condiments: *caroenum* and *sapa* (wine concentrates), *liquamen* (fermented fish sauce), and *oenogarum* (thick fish sauce blended with wine). Snacking at the public baths promoted overindulgence in food and drink, by which aristocrats gained reputations for imbibing.

A trend toward the late-afternoon *cena* and the *convivium* (private banquet) extended the service of many courses into the evening. Hosts dispatched slave runners with verbal invitations; guests provided their own napkins. Men, dining

apart from proper matrons, relaxed barefoot at a *triclinium*, a U-shaped arrangement of tables and couches in house or garden, and extended their hands for servants to wash. Tasteful hosts offered fresh water fish from stocked ponds and kept cellars of mountain wines from Ancona and Falernian wine from Campania, a perennial favorite. Multiple tales of food poisoning linked common toxic additives—aconite, death cap mushroom, or mandragora—with killers who exploited the drunkenness of their victims.

Meals at Home and Away

The *gustatio* (salad course) consisted of eggs, lettuce, mushrooms, and radishes adorned for more sumptuous gatherings with boiled fungus, clams, jellyfish, mussels, oysters, prawns, and sea urchins. Hosts served these rich appetizers with *mulsum* (Roman sherry), a sweet aperitif made from three parts grape must reconstituted with ten parts honey. Throughout six or seven courses, contrast dominated recipes, offsetting honey and vinegar. Fern shoots and onions were favorite sources of pickles. After guests' meticulous hand dabbling in aromatic water, a fine meal concluded in two stages—with *bellaria* (dessert), usually apples, cheesecake, custard, dates, figs, grapes, honey cakes, pears, and pine nuts. From this arrangement derived the cliché for a grand meal, *ab ovis ad mala* (from eggs to apples), the Roman equivalent of “soup to nuts.” The *comissatio*, a pouring of dessert wines, initiated lengthy table talk and enjoyment of music, riddles and word games, and professional reciters of verse. Public dining at a hired hall, forum (marketplace), or temple acknowledged the calendar with religious sacrifices, distribution of animal parts about the city, and communal feasting, which reached a peak of debauchery at Saturnalia, Roman Christmas.

Because of the scarcity of *deversoria* (hotels) and *hospitia* (inns), welcome into private homes placed demands on both traveler or stranger and host. Treasured mores obliged the homeowner to offer hospitality, a duty expressing the civility and refinement of the host and, by extension, of all Romans. For business and political ends, the peaceful sharing of meals and a discreet distribution of leftovers enhanced contractual arrangements and demanded reciprocity from all parties. The lessening of animosity and xenophobia accounted for the evolution

of the word *hostis* (enemy) into a stranger or visitor welcomed to the table. The punctilious host offered *lautia* (washing

Recipe: Sweet-and-Sour Cole Slaw

Oribasius, the Greek encyclopedist and dietetic adviser to the Emperor Julian after 361 C.E., followed the advice of Cato the Elder, a promoter of cabbage in *De Agricultura* (*On Agriculture*, ca. 160 B.C.E.). For a flavorful slaw, Oribasius chopped one-quarter head of red cabbage and tossed it with one chopped stalk of rue and one bunch of shredded coriander. For 2 tablespoons of dressing, he blended equal parts honey and wine vinegar and saturated the greens with the emulsion. To finish the salad, he topped it with a sprinkling of powdered asafetida, an antifatulant and digestive aid common to condiment and pickle recipes.

items) and *loca* (quarters) along with *munera* (gifts), tableware and chalices crafted from precious metals.

The head of household acquired esteem for his sharing of meals with strangers as well as dignitaries. One example, Marcus Tullius Cicero, the Republican era's master orator and statesman, opened his villa on the Palatine Hill to guests. Unlike the Greeks, who separated dining from wine consumption, Romans drank watered wine with communal meals, a means of stemming out-of-control mealtime aggression. Visitors displayed their thanks for fine dining with handclasps, wine toasts, and symbolic gifts that denoted ongoing friendship, patronage, and trade relations.

At the bottom of the plebeian class, courtesies took second place to the exigency of near starvation. Youths pilfered fruit stalls. Rioters demanded the bread dole, supplied by grain freighters from Alexandria to Ostia, Rome's warehouse and food distribution center. To reduce the number of beggars and petty criminals on the streets, the harried senatorial class continued feeding the poor.

Ostentation at the Table

Rich cosmopolites displayed their superiority by demanding gastronomical specialities, such as Asian aromatics and dyes for entrées. Extremes of cuisine included roasted peacocks served in their feathers and cage-bred dormice fattened on walnuts and stuffed with pork or veal. Professional chefs consulted the era's first cookbook, *De Re Coquinaria (On Cookery, ca. 35 C.E.)*, compiled by Marcus Gavius Apicius, a noted gourmet. In response to foolhardy lifestyles, the physicians Celsus, Galen of Pergamum, Rufus of Ephesus, Oribasius, Scribonius Largus, Asclepiades, Athenaeus, and Anthimus issued treatises on bathing and hygiene, exercise, holistic dietetics, and the therapeutic nature of balanced meals of sensible portions. In *De Alimentorum Facultatibus (On the Powers of Food, ca. 175 C.E.)*, Galen, the Turco-Roman nutritionist and physician to the Emperor Commodus, discussed foodstuffs by category—seeds, fruit and nuts, roots, animals and animal products, honey, and wine. He recommended honey for its stable sweetness and powers of healing, whether raw or cooked.

In an era when Romans lived along the sewage-choked Tiber and clogged city runnels, many died in their 30s from fevers, sudden gut ailments, and organ failures. Galen's directives said nothing about the scarcity of soap, which, in 300 C.E., cost the equivalent of two days' wages for a city baker or miller to buy 1 pound in liquid or solid form. Galen's *De Subtiliante Dieta (On the Thinning Diet, ca. 175 C.E.)*, a brief treatise on weight control, abandoned scientific jargon and Greek medical snobbery to acknowledge the worth of rustic Italian staples, which included chicory, lettuce, and wild herbs. For the sake of digestion, Galen contrasted baked with boiled foods in terms of palatability. To simplify the choices of body-friendly foods, he coded each as cold or hot, dry or moist, and matched suggested regimens to the individual's age, gender, and body humors. Table maxims about moderation warned of gluttony and wine guzzling and encouraged consumption of cheese, fish, and pulses (wheat porridge) along with whole-grain bread, pork fat, and fresh and dried fruit.

The refined urbanite ridiculed barbarians, who ate with both hands from common pots and haunches on spits and observed no table etiquette. For the privileged, from around 100 B.C.E., the house hold *coquus* (cook) superintended artistic meal preparation—bread, fresh produce, game, meats, and seafood. Shore favorites—crustaceans, cuttlefish, mollusks, snails, tuna—cost double the price of pork. Essential to the everyday diet, salty *garum* (fish sauce) served as a standard

table condiment, a contrast to the complicated saucing of nuts with herbs and the salvers of delicate *globuli* (cheese dumplings) and fish hors d'oeuvres offered at the tables of the wealthy. Moray, red barbel, and sturgeon, like present-day caviar and fugu fish, retained snob appeal.

The Roman *confarreatio* (patrician wedding) enhanced table civility by an advantageous alliance of bride and groom. An evening ritual involved the escort of the bride to the groom's home. While singers serenaded the new female head of household, the mother of the bride brandished a torch, symbol of the hearth. Gifts to the bride included a grain pan, pestle, and sieve. Prayers to Ceres, goddess of grain, and Juno, protectress of wives and pregnant women, accompanied ritual foods—a piece of honey-sesame wedding cake and a quince—representatives of wifely hospitality and fecundity. The evening concluded with a wedding dinner and the showering of nuts on the bride. The groom conferred blessing on his wife with gifts of fire and water, symbols of domestic responsibilities that traditionally belonged to women.

The Roman Sybarite

After Alexander the Great subdued Persia and Egypt in 333 B.C.E., Roman cuisine began its evolution into opulence with elements of Persian and Egyptian exotica. Improvements to waterways and canals at Milan and Ostia sped commodities and green goods to city markets and the kitchens of caterers. In place of lovage, mint, rue, and grape marinade, cooks began incorporating heavier Asian pepper and spices, notably asafetida and ginger. The Lex Fannia, legislation that Consul Caius Fannius Strabo sponsored in 161 B.C.E., regulated the amount citizens could spend on fish and meat and on the weight of silverware at table. Under Augustus, the first emperor (r. 27 B.C.E.–14 C.E.), sumptuary laws restricted extravagant banqueting and private expense for food, wine, and clothing, particularly Asian imports. Austerity represented a return to early Roman values instituted by a pastoral culture, a means of upholding the Roman ethos that the mythographer Ovid urged in *Fasti* (*Holidays*, 8 C.E.).

Both Tiberius and Nero attempted more stringent controls on fine dining, but the emerging equestrian class ignored the statutes in their passion for glamorous

dress and dining experiences. The occasional poet Catullus outlined the secret flirtations and grovelings at table; Petronius Arbiter satirized food fads of social climbers in *Trimalchio's Dinner* (ca. 65 C.E.) and joked about a wine switch from a prime Opimian to an inferior vintage. Rome's imperial land grab extended agricultural experimentation to Gaul, Germany, Hispania, and North Africa and as far north as land could produce wine grapes. To northern Gauls, officers of legions introduced carrots, celery, chickpeas, coriander, cumin, peaches, and silphium along with chickens, peacocks, pheasants, and rabbits. Armies established bimonthly food bazaars in North Africa and more frequent farmer's markets in Anatolia and Palestine.

Reciprocity made lasting changes in predictable Roman menus, producing a Hellenized fusion cuisine. Soldiers on leave brought home tales of African bushmeat, Belgian ham, Caspian caviar, Egyptian ibis and mustard, French oysters, Greek figs and wines, Lusitanian pomegranates and sweet olives, Palestinian arum root, Persian lemons and saffron, Spanish salt mackerel and wine, Syrian marjoram, and Turkish fish, and they developed a thirst for British barley beer. From Sicily, they learned the grating of goat and sheep milk cheeses over baked dishes to form a flavorful au gratin (cheese crust). Around 220 C.E., the Syrio-Roman Emperor El-agabalus spread color-themed banquets with chased silver casseroles of camel feet, crayfish forced meat, flamingo and nightingale tongues, mullet beards, ostrich brains, parrot heads, pig wombs, and raw cockscombs. He offered door prizes, invented the progressive, or house-to-house, dinner, and served embroidered napkins with joke desserts carved of clay, ivory, marble, or wax.

Famine precipitated an urban collapse. In 284 C.E., the Emperor Diocletian recognized the dangers of inflation and the desertion of farms as a subsequent threat to food markets. In Rome's declining days, in the late 300s C.E., St. Augustine condemned gluttons and sots for risking health through a disgraceful perversion of normal eating. After the collapse of taxation and the economy, food shipments ceased. Authorities banished outsiders. The siege by Visigoths in September 408 C.E. forced the city into a food panic. The reduction of the daily wheat ration from one-half to one-third precipitated the fall of the Roman Empire.

See also: Apicius; Einkorn Wheat; Emmer Wheat; Grilling; Maritime Trade Routes; Pickling; Pliny the Elder; Poultry; Pulses; Religion and Food; Sicilian Diet and Cuisine; Silk Road; Trade Routes; Trading Vessels; Vegetarianism; Vinegar; Yeast.

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[Royal Greenland Trade Department](#)

Beginning in 1774, the Royal Greenland Trade Department (Den Kongelige Grønlandske Handel, or KGH) monopolized commerce between the Inuit and Denmark for two centuries. At the time, Greenland's nomadic Eskimo flourished at commercial open-water fishing for cod and halibut, a Scandic staple. According to research into Inuit middens, their diet veered from seafood toward fat and red meat from caribou, polar bears, and seals, their principal food.

Investors pondered commercializing the far north for 35 years. Under order of Frederick IV, the king of Denmark-Norway, in November 1719, the Danes at Bergen broached the possibility of trading in fish, oil, and seals in the Faeroe Islands and Greenland. Because rumors of savagery and cannibalism of shipwrecked crews dissuaded Danish investors from colonizing Greenland, colonial plans faltered. Under royal charter, Hans Poulsen Egede, a Norwegian Lutheran missionary-colonizer and his Danish wife, Gertrud Rasch Egede, pioneered European trade on July 3, 1721, by settling 25 religious workers at

Godthaab (present-day Nuuk).

In his treatise *A Description of Greenland* (1818), Egede observed the Inuit cuisine and reported the consumption of boiled, dried, and raw meat from hares, partridges, and reindeer and of air-dried halibut and salmon roe. The Inuit sauced fish dishes with fat, scraped sealskins for tissue for pancakes, and drank only water as a beverage. During famine, they consumed catfish, discarded animal skins, partridge and reindeer intestines along with the dung, and red seaweed. The lack of cleanliness repulsed Egede, who watched families eat from dirty pots and dishes whenever they felt hungry. Men invited neighbor males to share meals; women gathered during the day while the men fished.

As whaling flourished, trading outposts along the west coast—Christianshaab, Frederikshaab, Godthaab, Jakobshavn—set the tone and style of interaction with nomadic natives. With the Danes, the Inuit exchanged fish, hides, kayaks, narwhal and walrus tusks, soapstone kettles and kitchen utensils, walrus rope, and whale blubber and bone sleds for gin, metal tools, and cookware. Moravian missionaries extended business at their own trading stations in 1765 and established gardens outside their island hospital. In *The History of Greenland* (1767), Moravian historian David Crantz reported on native meals of seafowl and small rosefish stewed in seawater. For snacks, the Inuit chose squares of raw *mattak* (narwhal or whale skin). Outsiders found inedible their prized delicacy—semi-frozen *mikkiak*, harbor seal flippers and heads rotted under grass until the hair fell off. For salad greens, the Inuit gathered angelica (wild celery), dandelion and sedum root, scurvy grass, and sorrel. They delighted in bilberries, cranberries, and crowberries, eaten with cod livers. Radishes, turnips, and wild peas were major vegetables; wild thyme provided leaves for an aphrodisiac tea.

As the monopoly gained hold, by March 18, 1776, colonial outposts and whaling stations rejected commerce with outsiders, particularly the competitive Dutch and English whalers. Danish law banned intrusive vessels within 4 miles (6.4 kilometers) of the coast, while state vessels offloaded seal blubber for refining at headquarters in Copenhagen into high-grade oil. In its sixteenth year, the KGH broke all religious ties and established a trading fleet under Danish sovereignty. In exchange for sole mercantile connections with the interior, Danish-Norwegian merchants established a paternalism that protected first peoples and preserved their bear-and fox-hunting economy. Nonetheless, the Inuit adopted European

ways, including smoking tobacco and drinking coffee and whiskey and cooking in copper and iron vessels. Encounters with Europeans introduced the Inuit to the luxuries of brown bread with butter and oatmeal.

In 1814, as a result of the Napoleonic Wars, Denmark broke ties with Norway and allowed Danish shippers Dahlén and Kall to vie for business at the Napossoq fishing station. In 1830, the fish and whale business yielded steady profits that paid colonial debts. Unswayed by European customs, the Inuit continued to revere their national dishes—walrus liver, seal ribs, and the meat of reindeer, which grew scarce from overhunting. They regarded bear and seal as caloric fuel for travelers. In *A Treatise on Food and Diet* (1845), pharmacologist Jonathan Pereira endorsed the traditional Greenlandic diet and cuisine as healthful and therapeutic in a frigid climate. He declared the basing of nutrition on fat and oil saved the aborigines from disease and early death. By 1912, commercial domination gave place to control by Grølands Styrelse (Greenland Administration). The KGH lost more autonomy in 1950 and separated from the royal company in 1990, when Greenland became self-governing.

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[Rumford, Count \(1753-1814\)](#)

An inventor and social strategist, Sir Benjamin Thompson, Count Rumford, created the science of nutrition and promoted home economics, dietetics, and sanitation as sciences.

Born on March 26, 1753 in Woburn, Massachusetts, Rumford apprenticed in commerce in his teens and educated himself in physics by attending lectures at Harvard. Wedded to heiress Sarah Walker, he advanced to major of the New Hampshire Militia and took the Tory side during the American Revolution. Because of charges of spying for the British, he abandoned his wife and daughter and left for England, where he served as undersecretary in the War Department. At age 30, he settled in Bavaria, where he received the post of major-general of the cavalry.

In his roles as humanitarian and nutritionist, Rumford declared cold and hunger the greatest enemies of humankind. He pitied the underemployed industrial class and introduced corn and potato cultivation and the use of macaroni and polenta as antidotes to slow starvation. In 1790, to feed Munich's 2,600 beggars, he established the Poor People's Institute, where he disguised potatoes by mashing them until the underclass accepted them as food. To nourish the troops of the duke of Bavaria, he experimented with boiling bones along with inexpensive cuts of meat in huge vats called "digesters."

Calculating the maximum nutrition for the least expenditure, the count formulated Rumford's Soup from barley, peas, and potatoes boiled in sour beer and served it at feeding stations three times a day with 5 ounces (142 grams) of rye bread. He declared bread rations indispensable and denounced tea as a deterrent to health and a waste of money. For "burnt soup," a substitute for coffee and tea, he roasted wheat and rye meal in butter and added pepper, salt, and vinegar. By putting the homeless to work in military factories, he provided them with meals, sanitation, and warmth. He later published the result in an essay, "Of Food and Particularly of Feeding the Poor" (1796).

Public kitchens and hospital dietetics offered vagrants *cuisine du pauvre*, a nourishing diet for the poor, as well as health care. In London, where 600,000 Irish immigrants arrived in a single year, Rumford's soup kitchens fed 60,000 daily. The concept spread to Marseilles and Paris, France, and Geneva and Lausanne, Switzerland. In Glasgow, Scotland, petitioners found relief for empty bellies in Rumford's recipes for barley broth and potato soup. Knighted by George III, he earned the title of Count Rumford in 1791 for his innovations with gunpowder, shell velocity, and signaling at sea, but not for his attempts to relieve human suffering.

In 1796, Rumford improved the draw of flues to direct smoke upward by rounding the fireplace opening, thus applying more heat to hearth cookery. One design involved a semicircle of masonry embedded with several small hearths. Cooks superintended pots set in holes over the flames. Within two months of building his prototype, 250 Londoners reconstructed the fireplace and grate according to his design, which improved coal combustion.

While experimenting with thermodynamics at the Royal Institution of Great Britain laboratory in 1799, Rumford invented a brick-and-cast iron kitchen stove that streamlined the use of coal and wood. In a demonstration of convection heating in closed-fire cookery, he roasted 112 pounds (51 kilograms) of beef with 3¢ worth of coal. He conveyed rising heat to hot water reserves and warming closets to drive dampness from linens.

Rumford relished details. He drew plans for a teakettle, stacked pans, and a double boiler suited to slow cooking. For the dining room, he devised a better Argand lamp, called the Balloon Illuminator, in 1805. Two years later, he pioneered a multichambered coffee percolator that retained the flavorful oil of coffee beans. Because his suggestions improved military uniforms and diet, he achieved membership in the Royal Swedish Academy of Sciences.

As a testimonial to domestic economics, environmental chemist Ellen Swallow Richards demonstrated the Rumford Kitchen at the World's Columbian Exposition in Chicago in 1893. Equipment derived from the count's specifications included steam and pressure cookers and the double-bottomed saucepan. For two months, kitchen manager Harriet Maria Daniell of Boston produced dishes for some 10,000 visitors that modeled maximum nutrition from ordinary ingredients. Menus included Rumford's recipes for baked apples, baked beans, brown bread, corn soup, fried potatoes, hasty pudding, pea soup, and potato salad. Sanitarians issued pamphlets on kitchen hygiene and the significance of carbohydrates, fats, and protein to the body. Sarah Wentworth extended Rumford's altruistic visions by establishing Rumford Kitchens for insane asylums.

See also: Beer.

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Russian Diet and Cuisine

A regimen of food and beverage heavy in carbohydrates and saturated fats, the Russian diet and cuisine features cold-weather crops, grains, and pickled fish. The eighth-century Slavs set a pattern of combing forests for wild berries, currants, greens, and nuts and killing deer, rabbits, and squirrels. Agricultural products consisted primarily of milk, millet, and rye. Fall chores required drying, freezing, pickling, and smoking to make stocks last through winter.

From the 800s into the 1900s, peasants countered the effects of blizzards and harsh winds with home-grown root crops and cabbages and purchases of goat's milk, kefir (a fermented milk drink), and yogurt from farmer's markets and street kiosks. They stocked larders with carrots, dried cherries and cranberries, honey, game, and marinated apples and fish. Boiled beef and pork arrived at the table in loaves coated with aspic or calf's foot jelly. A constant in pantries was the makings of borscht (beet soup) and potato straws, two national dishes.

Traditional servings of soup favored cabbage, introduced in the 800s from Byzantine Greeks. Other ingredients—brined cucumbers, *kvass* (fermented rye), mushrooms, noodles, and sorrel and nettles—amplified both hot and cold soups, some garnished with a dollop of *smetana* (sour cream). From the steppes, Russia's breadbasket, came cereal grains—barley, millet, rye, wheat—which reached the table in black bread, blini (crepes), fritters, noodles, wraps for meat-filled *pirozhki* (dumplings), and alcoholic beverages, namely beer, kvass, and vodka. Siberian *pelmeni* (savory meat pies) gained flavor and mouthfeel from boiling in broth. Farther south, in Georgia, garlic dominated dishes. During famines garlic and hemp oil flavored grain dishes.

From the tenth century, Russian Orthodoxy generated control over feasting

and fasting. With 200 days of the year given to fasts, peasants substituted mushrooms in recipes calling for forbidden dairy, eggs, and meat products. During Lent in the Middle Ages, only the privileged could afford fish pie and salt herring. Peasant celebrants made birch drinks and mead from honey to drink with sponge cake, which bakers marked with *XB*, the first two letters of “Christus” in the Cyrillic alphabet.

Gatherings centered on the home stove, a symbol of warmth and cheer. Thus, the Russian diet avoided raw foods and propitiated the almighty with prayers over fuel for the oven. According to peasant wisdom, “The stove is like the altar: We bake bread in it.” The aphorism revealed the Russian reverence for bread as a sacred source of life.

European Imports

Periods of European influence, beginning in the late 1400s, introduced traditional cooks to the delicacies of Renaissance Austria, France, and Italy. During the reign of Ivan III, Italian stonemasons introduced pasta and

[Recipe: Ukrainian Borscht](#)

Chop two large beets with a tomato, a carrot, an onion, a potato, and a small cabbage wedge. Sauté vegetables in 2 tablespoons of butter. Place vegetables in 1 quart of salted beef broth with 1 tablespoon of peppercorns and a bay leaf. Boil for 20 minutes. Serve with a rounded tablespoon of sour cream and a generous sprinkling of red wine vinegar, black pepper, and dill weed.

gelato. Black tea arrived from China in the 1600s, when the Russians wholeheartedly adopted it as a national beverage.

After 1682, Czar Peter the Great promoted coffee prepared Turkish style and imported French chefs to refine menus with bechamel sauce, green leafy salads and smoked fish and meat. Flaky pastries filled with caviar preceded wine and champagne and decadent chocolates and ice cream for dessert. From Russian

influence, French table service changed from a full spread to course servings, which allowed cooks greater control of the temperature of individual dishes.

In the 1760s, Catherine the Great added new dimensions to cooking styles with goods from Japan and wine from Hungary. Her kitchen staff advanced from peasant fare to exacting recipes for Beef Stroganoff, Chicken Kiev, Madeira cake, and Veal Orloff, dishes popularized in China and Scandinavia. During this same period, she warehoused grain in Petersburg to ensure food and fodder for her subjects and maintained a watch on military rations.

Under the health-conscious Romanov czar Alexander III, palace kitchens served spartan meals expected of hunters and soldiers. In the 1860s, Lucien Olivier, manager of the Hermitage restaurant in Moscow, concocted the Olivier salad, a potato-and-mayonnaise salad containing diced boiled eggs, capers, caviar, duck, ham, peas, and pickles. Variations of the salad attained popularity in Belgium, Bulgaria, Greece, and Turkey.

The expansion of railroads alleviated some of the historic Russian fear of starvation during a hard winter. Supplies of goods also increased in 1896 after the crowning of Alexander's son, Nicholas II, the last Romanov czar. His magnanimous gesture to peasants caused a catastrophe at distribution centers, where some 3,000 died of trampling while struggling to grab food from the imperial allotment. The czar's ignorance of hunger boded ill for his dynasty and nation.

From Empire to Soviet State

Cookbook compiler Elena Burman Molokhovets preserved classic Russian menus in her household text *A Gift to Young Housewives* (1861), which by 1917 reached a print run of 295,000 copies. In the last 56 years of Romanov rule, from the emancipation of serfs in 1861 to the outset of the Bolshevik revolution in 1917, she covered the gamut of the bourgeois bride's responsibilities, from making fruit liqueurs to serve at evening tea to plating and garnishing pâté and mousse for a banquet table. The last 11 chapters list dishes suitable for fast days, including greens and aspics, buns, and compotes. Details mention keeping fish frozen in the ice house and corking infusions of black currant leaves to keep them from

exploding in the cold cellar during the winter.



A Soviet-era poster (1947) exhorts farmworkers: “Work hard during harvest time, and you will be rewarded with plenty of bread.” Centrally planned collective farming produced disastrous declines in agricultural output, livestock, and food supply. (*The Granger Collection, New York*)

Russian revolutionaries denounced Molokhovets’s Gallic cuisine, tea with jam, colored Easter eggs, and wines as too gentrified and class conscious to benefit godless Communist dogma. Breadlines and food shortages belied the bias of Molokhovets’s recipes, which appealed to aristocratic households, with their vast pantries and hordes of servants to whip eggs for *babka* (coffee cake) and mince beef for bouillon. Exigency ruled food processing. In Bulgaria, Hungary, and Yugoslavia, pickling extended the commercial use of vegetables. Salting turned cabbage into sauerkraut; smoking made sausages a long-lived pantry meat.

During the Great Hunger of 1921, 10 million Soviet Russians starved to death, primarily in the Ural-Volga area. Frugal peasants reverted to hearty vegetable soups, dumplings, and meatballs made from organ meats and pig’s knuckles,

milk, and onions. Migration created a situational fusion cuisine as foodways from the world's largest nation blended into the Russian diet. From Estonia, Latvia, and Lithuania emerged a new emphasis on cream and egg dishes. Rice pilaf came from Uzbekistan, fried pies from Kazakhstan, carrot salad from Korea, anchovies from the Black Sea, and red wine from Georgia. To move foodstuffs across the great nation, international relief workers set up feeding stations at depots to strengthen railroad workers.

After collectivization in 1929, the hungry and homeless raided agricultural fields. Overfishing killed off native species, reducing a source of wild foods for remote villagers. Rationing continued until 1947; in the 1960s, public catering served inexpensive, regimented meals in government institutions and factories. Russian art and literature of the 1960s revealed a mystic longing for the sweet life, when grocers offered an array of imported cheeses, citrus fruit from the Middle East, and foreign coffees and canned goods.

Food Commerce after Communism

Currently, 10 percent of "New Russians" dominate the nation's wealth, while 70 percent of citizens live in poverty. Unstable economic conditions in the Russian Federation, formed in December 1991, exacerbate shortages. Child nutrition falters from unmonitored school lunches, and urbanites cultivate fewer home gardens. Nonetheless, Russia is the world's third-largest producer of roots and tubers, including celeriac, parsley root, and turnips. Farmers rely heavily on pesticides. Corn and rice, which first entered Russian cuisine in the 1990s, are still scarce. Produce in the Republic of Tyva in eastern Siberia costs five times the average price in Russia. On the Kamchatka Peninsula, on Russia's far northeastern border, inadequate produce during the winter months forces families to rely on meat-heavy meals from hunting and fishing.

Food insecurity allows unsanitary conditions and cross-contamination in abattoirs and seafood shops. Supermarkets cheat on weights and measures, rewrap foods, and remove date stamps. Least affordable are fiber-rich fish and fruits, which require lengthy transportation. In place of fresh foods, Russians rely on bread and potatoes. The results of an undependable food market and lax

consumer laws are serious mortality patterns from alcoholism, binge eating, diabetes, malnutrition, and obesity, which afflicts one-third of the citizenry.

A reduction in breast feeding leaves children undernourished from micronutrient deficiencies. Those infants who receive adequate nursing incur an insidious deterrent in milk containing polychlorinated biphenyls (PCBs) from environmental pollutants. Weaning at four months produces another divergence in child nutrition, as only some receive fortified infant food. Children of the poor are more likely to subsist on iron-deficient porridge and unfortified flour and milk, an impetus to frequent infections. Stunted growth is common in Uzbekistan, Azerbaijan, and the Kyrgyz Republic. Global food aid tends to reach only 5 percent of the needy.

Despite economic and political obstacles, Russian conviviality revolves around the table and pleasurable food consumption. To avoid the expense of home cooking, students and workers rely on canteens. Most breakfast menus list sausage, eggs, cheese, and *kasha* (porridge), a traditional grain dish that Prince Alexander Nevsky introduced in Novgorod in 1239. Lunches consist of egg and vinaigrette salads, smoked salmon, tongue and sausages, baked mushrooms, and fish soups. Desserts range from fruit blini and cottage cheese with jam to nut cakes and halvah, a spread made of nuts and sesame or sunflower seeds, served with beer, cognac, or fruit juice.

See also: Ice Cream; Kitchen Gardening; Lapérouse, Jean François Galaup; Malnutrition; Trade Routes; Wheat.

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S

Salad and Salad Bars

One of the most individualized styles of food service, salads incorporate both cooked and raw ingredients from eggs, fruits, gelatins, grains, mushrooms, pasta, meats, and vegetables. Servings usually arrive cold or hot but can also be mixed—for example, killed lettuce, a Southern specialty sauced with hot bacon and vinegar dressing at the last moment before plating. Ingredients favor indigenous foods, as with the peanut sauce atop Indonesian *gado-gado*, a coddled egg in Irish egg mayonnaise, bean sprouts in Japanese *goi gia*, feta cheese in Greek salad, Arabic orange and onion salad, and fresh Dungeness crab in the Crab Louie, a San Francisco original.

Salad fits any meal—appetizer, main and side dishes, cold lunches, picnics, and desserts. Salad makers enhance fruit and vegetable fare with a variety of toppings — bacon bits, croutons, noodles, pepperoncinis, shredded cheese, sliced almonds, toasted crumbs, tortilla strips, walnuts, and whipped cream. Main-course salads assist diabetics, dieters, and calorie counters by topping cucumbers, greens, lettuce, peppers, and tomatoes with a seared meat, usually chicken breast, salmon, or sliced skirt steak. Restaurant menus code these servings with symbols for “heart healthy,” “low carbs,” and “high fiber.”

The Classical World and Middle Ages

The earliest evidence of salad making appears in Egypt in 4500 B.C.E., when kitchen gardens featured chicory and lettuce. By 2400 B.C.E., Mesopotamians were marinating raw vegetables to preserve their flavor and crunch. In 465 B.C.E., the Persian king Artaxerxes favored watercress as a wild food accompaniment to roast meat.

The Greeks and Romans tempted the appetite with an uncomplicated dish of

olives and lettuces flavored with anchovies, caraway, coriander, fennel, and garlic. For *moretum*, a bowl of crushed garden herbs honored in one of Virgil's minor idylls, Roman chefs grated cheese and crowned it with coriander, garlic, onions, parsley, rue, and spices. From the amalgam came the motto *E pluribus unum* (One out of many), a salute to the forerunner of pesto.

Pliny the Elder, Rome's first encyclopedist, declared that eating raw salads saves time and fuel for cooking. Because of the sharp taste of vinegar dressing, gourmands debated whether salads belonged at the beginning or the end of the meal for maximum digestion. The physicians Hippocrates and Galen voted for an initial salad course to introduce high-fiber vegetables that soothed the alimentary canal and moved readily through the gut. Byzantine Greeks used the term *salad* to refer to the salting of fresh greens and the pickling of vegetables, a common preservation method in India and China. During Lent, Christian monks favored raw greens as a break from bread and water. For guests, they dressed their spare plates with nasturtiums, primroses, and violets, all gentle on the stomach and conducive to rest.

In Southeast Asia, a traditional Thai side dish, *som tam*, began with shredded green papaya and added crabs and fish or shrimp sauce to beans, tomatoes, and spondias, a crunchy tropical plum. Disparate flavorings—chili, garlic, lime, palm sugar—capped the whole with four tastes, hot, salty, sour, and sweet. Tabbouleh, a savory Levantine salad dating to the Middle Ages, contrasted a hot, dry climate with a mouth-moistening blend of chopped mint and parsley. Mixed with bulgur, cucumber, onion, and tomato, tabbouleh became a national Syrian specialty.

In the 1090s, European crusaders first encountered fresh side dishes of raw vegetables, which cooks in their home countries considered dangerous to the stomach. Soldiers returned home to spread healthful, tasty recipes incorporating wild herbs—fennel, fern, mint, parsley, rue, sage, and thyme. Huou, the chef of Kublai Khan's imperial kitchen, compiled the first recipe around 1330 C.E. for a Chinese fish salad. To marinated slivers of raw carp, the cook made a dressing from basil, chives, ginger, knotgrass, and radishes, all stimulants to digestive juices. A popular French mix, recorded in Taillevent's *The Provisioner* (ca. 1375), a sourcebook of medieval cuisine, involved blending herbs and saffron into strawberry salad. A deterrent to the late-medieval salad maker, outbreaks of cholera from contaminated water made rinsed raw ingredients risky for all

diners, especially children and the elderly.

Modern Varieties and Purposes

The Renaissance chef turned salad into a mealtime attraction. After 1492, the concept of a raw greens course passed from Spain to North America. In the 1500s, Italians popularized the recycling of stale bread in a panzanella, a layering of garden vegetables, black olives, capers, and garlic over pieces of wheat bread. Late in the century, English botanist John Gerrard described in his *Herball, or Generall Historie of Plantes* (1597) the first potato salad, primarily plain ash-roasted tubers dressed with oil, salt, and vinegar. German cooks improved on cold potato salad with a hot version and added sauerkraut salad, a thrifty use of cabbage as an antiscorbutic.

Cross-cultivation of east and west yielded a major shift in cookery. William Shakespeare made an indirect salute to fresh foods in *Antony and Cleopatra* (1605), in which the Nile queen describes her youth as “my salad days” (I, v, 76). By 1608, Spanish tables in Seville featured cucumber salads incorporating tomatoes, a New World discovery. In 1627, Venetian physician Salvatore Massonio published *Archidipno: Overo dell’Insalata e dell’Uso di Essa* (*The Best Banquet: The Salad and Its Uses*), a scholarly view of the subject as food for rich and poor. The text isolated the contributions of garlic, oil, pepper, salt, and vinegar, and covered the nourishing, stimulating, and therapeutic effects of all types, from greens alone to beans and herbs topped with cold capons and pheasant meat.

In 1699, nutritionist John Evelyn, an English gardener at Sayes Court, Deptford, summarized the value of salad vegetables in *Acetaria: A Discourse of Sallets*, listing the health benefits of fennel as a sharpener of vision and praising cress for clearing the brain. Evelyn ventured from the ordinary by mentioning samphire, pennywort, and nettles. His expert opinion on the “herby-diet” (vegetarianism) altered English thinking about the dangers of raw foods to the stomach.

Interest in raw food increased. For the upscale diner in 1700, English and French restaurants popularized salmagundi, the original chef’s salad. It consisted

of a platter of eggs, fruit, greens, meat, nuts, salt herring, seafood, and vegetables topped with spice and a tarragon vinaigrette dressing. For eye appeal, chefs arranged ingredients by color, texture, or type and sprinkled the finished dish with a unifying dressing and citrus garnish. After the ouster of French aristocrats following the revolution of July 14, 1789, émigrés to England made chic a dish of mixed raw vegetables and flavorful dressing compounding vinegar and egg yolk with ground anchovies, caviar, meat extract, and soy.

Chefs continued concocting a host of salad possibilities, including the popular *macedoine de fruit* (fruit cocktail), a popular addition to menus in the 1790s. It preceded ambrosia, a mix of bananas, citrus fruits, coconut, and pineapple flavored with a bit of brandy or sherry. A nineteenth-century high-fiber favorite among Germans, three-bean salad featured the contrast of garbanzo beans with green beans and kidney beans in a sweet-sour sauce. Late in the 1800s, the Belgians introduced blanched endive and chicory to France; the Dutch devised coleslaw, basically chopped cabbage bound with mayonnaise and vinegar.

The emergence of home economics schools of cookery upended salad tradition by organizing chopped vegetables and greens and isolating them in molded gelatin. The end of the Gilded Age relaxed control of ingredients and introduced tuna salad and the tossed salad, a symbolic devil-may-care attitude toward raw foods. In 1906, to accommodate a sedentary lifestyle, Fannie Farmer, America's top cookbook writer, suggested mixes of chicory, cress, and cucumber as a way to keep cool. In 1916, botanist George Washington Carver advised black cooks to make salads from apples, bananas, cabbage, and celery and to dress them with peanuts, a cheap source of protein. A Yuletide highlight of the 1920s, the Candle salad assembled a banana in a pineapple ring and capped the "candle" with a maraschino cherry, a child-pleasing suggestion of flame.

On July 4, 1924, at a restaurant in Tijuana, Mexico, Italian American chef Cesare Cardini created a Prohibition era classic, the Caesar salad. He drew crowds from Hollywood south of the border to eat well, gamble, and drink legal alcohol. According to his daughter Rosa, when groceries ran low, he improvised a salad from hearts of romaine topped with grated parmesan cheese and soaked in flavorful dressing blended from egg yolk, garlic, lemon juice, and olive oil. Mixed at the table, traditionally in a large wooden bowl, the Caesar salad offered a side dish of finger food garnished with fresh curls of hard Italian cheese. The

ingredients were so congenial that the International Society of Epicures of Paris named it America's greatest recipe for the past five decades. A fan of the salad, Wallis Warfield Simpson, the Duchess of Windsor, indulged in Caesar salad at her haunts in Barbados and on the French Riviera.

Similar distinctive blends contributed named salads to menus, such as green beans, olives, and anchovies in the Niçoise salad, a Provençal original; leaf-topped celery stalks and parsley sprigs served to Victorian diners; and the pâté de foie gras salad that memoirist Mary Chesnut ate in Charleston in April 1861 near the outbreak of the Civil War. The Waldorf salad, which Waldorf Astoria manager Oscar Michel Tschirky invented on March 13, 1893, captured the distinct flavors of apple cubes and celery dressed with mayonnaise. Less interesting, the heart of lettuce wedge of the 1920s offered a quarter of a head of iceberg lettuce with creamy French or Russian dressing.

In 1937, the Brown Derby in Los Angeles produced a standard California recipe, the Cobb salad, a mix of avocado, bacon, and chicken breast on raw vegetables topped with Roquefort cheese. In the 1950s, a tricolor Italian alliance in the *insalata caprese* imitated the colors of the national flag with basil leaves, mozzarella, and tomato slices. Tex-Mex restaurants of the 1960s adapted original menus with the taco salad, a layering of string beef and guacamole with cheese and salad ingredients in a fried shell.

The thrifty, health-conscious lunch bunch of the late 1960s promoted raw spinach and the pasta salad, an American reshaping of potato salad with pasta. Carryout shops and hotel restaurants offered the pasta dish as a cheap, refreshing à la carte item preferred by dieters. More popular in the Caribbean, French rice salads followed the same regimen by pairing bland cooked rice with raw vegetable bits and a savory vinaigrette.

Salad Bars

The salad bar, first advertised in 1951 in Springfield, Illinois, ushered in an acceptance of the salad as an individualized starter. To speed service and limit food handling, buffet counters offered diners assorted raw greens, sliced and chopped tomatoes and cucumbers, celery and green peppers, and regular and diet

dressings. The self-serve bar held the customer's attention until the presentation of the dinner order. Bigger spreads, beginning with salad bars in Norman E. Brinker's Steak and Ale restaurants in Dallas, Texas, added toppings—bacon bits, deviled eggs, shredded cheese, croutons and crackers, taco strips, pita chips—and side servings of chili, coleslaw, potato salad, and soups.

In 1978, Shakey's Pizza Parlor, anchored in Sacramento, California, became the first chain restaurant to feature hot and cold salad counters. Restaurants in Australia and South Africa followed the North American example, which flourished in California, North America's "land of salads." Supermarkets cut into the restaurant trade by luring singles to pick-up boxes of fried chicken, submarine sandwiches, and salad counters selling individualized fare by the pound. Heading the bill of fare, designer greens mingled arugula with chicory, frisee, and mesclun and popular dressings, particularly honey mustard and chipotle vinaigrette.

Salad counters were scenes of the first and largest bioterrorist attack on the U.S. food supply. From August to September 1984, members of the Rajneeshee mystic commune in Oregon chose the poisoning of salad bars at 11 restaurants in The Dalles, Oregon, as a means of disabling local voters in a county election. The tainting of salad items and dressing with salmonella sickened 751 diners. Until health officials could locate the source of contamination, they closed local salad bars, including one at Mid-Columbia Medical Center. The attack failed to kill diners or to forestall the Oregon election.

The concept of the self-serve food bar survived public fear of terrorists and expanded to public schools, colleges, naval vessels, and nursing homes. In 2004, the Ruby Tuesday chain enlarged on the salad bar concept by offering low-carbohydrate, low-fat specials as a sidedish or a full meal. The United Fresh Produce Association Foundation of Washington, D.C., initiated a crusade in 2010 to open a salad bar in every school. In Ipanema at the Brazilian Steak House in January 2011, management experimented with full service of antipasto, vegetables, and potatoes at the salad bar with only meat requiring an individual order.

See also: Jefferson, Thomas; Raw Cuisine; Russian Diet and Cuisine; Vegetarianism.

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Salt

A crystallized mineral used as a seasoning, salt introduced world palates to food enhancement as well as a means of food preservation of dishes, from ciabatta bread to dill pickles.

Dealers who obtained sodium chloride by evaporating brine or seawater or by mining rock crystals turned such ancient towns as Cadiz, Jericho, Lagos, Tyre, and Zigong, China, into commercial meccas. Salt contributed so many minerals to animal well-being that it bolstered shore trade with inland cultures, providing the Assyrians, Egyptians, English, Ethiopians, Hebrews, Malians, Nigerians, Persians, Phoenicians, and Thais with a medium of exchange easier to use than coins. Around 2700 B.C.E., the Chinese described healing with 40 salt varieties, which they unearthed through bamboo shafts. The Greeks and Romans valued salt imported from Bavaria for use in preserving *garum*, a fermented fish sauce that permeated their diet and flavored their cuisine. Routes to salt mines and salt pans, such as the Via Salaria, a trans-Italian route from Castrum Truentinum to Rome, attested to the value of barter in mineral crystals. Around 800 C.E., the availability of salt enabled the Vikings to market Baltic cod, meeting a demand

far from marine centers.

From the late Middle Ages, the salting of fish, especially to provisioners of armies, press gangs, and sailing vessels, enriched first Norway, then the Hanseatic League, which controlled the ports of Bergen, Brügge, Danzig, Falsterbo, Hamburg, London, Lübeck, Riga, and Visby and commercial centers at Göttingen, Köln, and Novgorod. In Sweden, where herders turned cattle and swine into the woods to fatten the animals on grass, nuts, and roots, the annual fall slaughter in late October required salting of butter, hams, joints, and sausages to preserve animal goods for winter and times of famine. In 1559, salt made up one-quarter of the country's imported goods. In 1526, King Gustavus Vasa established priorities for the use of annual salted foods to ensure an uninterrupted supply. In contrast, the British East India Company angered the Hindus of India by monopolizing and overcharging for salt supplies. The manipulation of table condiments resulted in riots and clashes with the redcoats from the Indian Ocean north to Bengal.

Amerindians recognized that the body could not survive without salt. In *Comentarios Reales de los Incas* (*The Royal Commentaries of the Incas*, 1609–1617), the Peruvian historian Garcilaso de la Vega described pre-death tissue breakdown in those with chronic deficiencies. Spanish explorer Hernando de Soto, on his march across the southeastern United States, found saltworks in operation in northwestern Louisiana and Arkansas. He summarized four sources of salt—brine springs, plant ash, rock salt, and sand. Dealers ranged outward from these sites as well as from the salt licks of Kentucky, Tennessee, and West Virginia to trade among tribes. These and other mineral sources on the borders of the Confederacy became battlegrounds during the American Civil War, as Union forces curtailed salt distribution to limit the amount of bacon available to rebel troops.

Cooks have turned salty foods into such national and regional specialties as Boston baked beans, Italian pancetta, Laotian fried algae, Norwegian lutefisk, and Zuñi dumplings. In the twenty-first century, artisanal salts have gained a reputation for complex flavors. Among these are Alaea clay sea salt and black lava salt from Hawaii, flake salt from Cyprus, English crystals from Maldon, pure Jurassic salt from the Himalayas and Utah, Kala Namak vegan salt from India, Murray River garnishing salt from Australia, Okinawan *masu*, pink Peruvian

meat flavoring, Salish smoked salt from the Pacific Northwest, Welsh Halen Môn crystals from the Atlantic, and delicate Portuguese *flor de sal* or *fleur de sel*, a valuable Breton cash crop. The Balinese enter serene seas to collect water for evaporation in hollow palm trunks and use with coconut and lime. Barefoot Filipinos weather high heat while raking salt crystals from tiles laid over mineral-rich mud.

The Japanese hand-stir slow-cooked slurries into *nigari* (bittern), a flaky magnesium chloride that flavors infant formula and sports drinks and coagulates soy milk into tofu. Other specialists crystalize grains in molds to produce ingots similar to the pottery *briquetage* of ancient salt makers. Contributing to the taste appeal are trace amounts of 85 sea minerals, primarily, boron, calcium, iodine, iron, lithium, phosphorus, potassium, silicon, and sulfur. A negative effect of *nigari* is the increase in cravings for sodium chloride. *See also:* Cod; Curing; Desalination; Grilling; Pickling; Pliny the Elder; Polo, Marco; Sausage; Scandinavian Diet and Cuisine; Theophrastus; Water.

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Sanitation

Purity of foodstuffs and water supplies became a human issue after people began to connect domestic, farm, and commercial waste with sickness and death. After the development of agrarianism in 7000 B.C.E., families composted domestic garbage and fertilized plants with human feces. For reasons of family safety, as early as 6000 B.C.E., the Harappans of the Indus Valley directed home wastes to covered drains. The Talmud, a compilation of oral discussion of holy law

compiled from 200 to 500 C.E., warned Jews of types and sources of contamination and levels of impurity. Specific taboos covered the contamination of perishables, disposal of peels and shells, and methods of cleaning and rinsing hands, dishes, utensils, ovens, and hearths to ensure sanitation.

Hygiene problems often resulted from carelessness with sewage, a source of cholera, dysentery, gastroenteritis, hepatitis A, and typhoid fever. The Romans protected their water supply with covered aqueducts and lead piping to and from public bathhouses and toilets. Unfortunately for Rome's urbanites, knowledge of the symptoms of lead poisoning lay far in the future. Because of ignorance of microbes during the Middle Ages, families tended to situate privies conveniently near sources of water. Newfound vigilance resulted during the mid-fourteenth century, when the Black Death increased concern for the safe disposal of tens of millions of corpses and the disinfection of contaminated dishes, bed linens, and towels.

In the early Renaissance kitchen, the cook commanded respect for a complex responsibility. Italian food critic Bartolomeo Platina's *De Honesta Voluptate et Valitudine* (*On Right Pleasure and Health*, 1475) summarized the qualifications of the cook, which required skill and experience. In addition to being free of disease and knowing the ins and outs of selecting and preparing foodstuffs, Platina added that kitchen staff should clean themselves of dirt and filth. Before food preparation, the cook had to purchase the highest-quality stock and keep it free of vermin during warehousing or shelving. Food managers and commercial cooks began storing staples in lidded containers and stoppered jugs.

Twentieth-Century Advances

In the Western Hemisphere, sanitation got a jolt from scandal. Author Upton Sinclair's muckraking novel *The Jungle* (1906) dramatized the foul conditions in Chicago's Union Stockyard. His exposé particularized unclean hands and cleavers used for the chopping of spoiled meat into sausage, grinding rats into potted meat, sweetening and deodorizing of soured meat pickle with soda, and treating spoiled hams with hot irons. As a result of public outrage, on June 30, 1906, President Theodore Roosevelt goaded Congress to pass the Pure Food and Drug

Act to halt fraudulent labeling and interstate trafficking in inedible and adulterated foods and drugs. The law established the secretary of agriculture, then James Wilson, as a federal watchdog over samples of imported goods and the storage and cartage of edibles.

In 1927, Congress instituted the Bureau of Chemistry, forerunner of the Food and Drug Administration (FDA), the nation's oldest consumer protection agency. The efforts of Ruth de Forest Lamb, the FDA educational officer and compiler of *The American Chamber of Horrors: The Truth About Food and Drugs* (1936), advanced support for a subsequent law, the 1938 Federal Food, Drug, and Cosmetic Act, or Wiley Law. The legislation fought medical quackery, pesticide residue, food adulterants and dyes, and deliberate misbranding by replacing widely varying state regulations with a firm national standard of purity.

Meanwhile, machines increased the cleansing of kitchens and pantries, particularly ion and ozone purifiers and steam cleaners. One technological advance in reducing putrefaction in food was the creation of the electronic nose, which George H. Dodd of the University of Warwick and Krishna C. Persaud of the University of Manchester Institute of Science and Technologies pioneered in the United Kingdom in the 1980s. Aroma detection equipment used polymers to bind to vapor and isolate rotting foodstuffs in rail, truck, and seagoing containers before decay ruined a whole shipment. By loading microchips with minute dots of different polymers, a single detector could search for hundreds of malodorous amines and thiols, including sources of food poisoning.

In the United States and Britain, research into the nature of the *Escherichia coli* (*E. coli*) bacterium unmasked its full genome sequence. At the University of Wisconsin at Madison, geneticist Nicole Perna disclosed the origin of a strain that caused a February 1982 outbreak at a McDonald's restaurant in Oregon from undercooked hamburgers made from an infected cow. One idiosyncrasy of *E. coli* was its horizontal gene transfer from bacterial viruses, a sharing that promoted rapid mutation. While chairing a pan-European investigation of food-borne contamination, Geraldine Duffy, a microbiologist at Dublin's Teagasc National Food Centre, predicted that knowledge of the bacterium's makeup and methods of reproduction would make it easier to conquer.

Consumer agencies increased health warnings, resulting, in 1986, with a ban on Alar, a growth regulation spray for apples, and additional surveillance of food

colorants and flavorings, notably additives to baby food. In December 1993, the *Wellness Letter* from the University of California, Berkeley, dispelled myths that Silver-Stone vessels and Teflon-coated, aluminum, cast-iron, copper, enamel, glass, and stainless steel cooking utensils jeopardize health. The text declared plastic, glass, ceramic, and earthenware vessels generally micro wave safe. It warned against home microwaving of margarine tubs not identified safe for microwaving and indicated that the melting of thermoplastics leaches polyethylene terephthalate (PET) into food. The author cited research that acidic solutions cause stainless steel to exude chromium, iron, and nickel, sources of heavy metal poisoning and nickel allergy.

To aid people in Bangladesh, Brazil, Egypt, Ghana, Malawi, Namibia, Nigeria, Pakistan, Peru, South Africa, Sudan, and Thailand in avoiding water- and insect-borne malaria and enteritis from unsafe drinking sources, new disinfectant generators and small-neck storage vessels prevented contamination of potable water. From 1981 to 1990, the World Health Organization's Drinking Water Supply and Sanitation campaign increased accessibility to sanitary supplies but could not keep pace with population density and urbanization. One answer to the problem of impurities involved point-of-use disinfection with sodium and calcium hypochlorite, a practical alternative to boiling where fuel was scarce and expensive. Application of solar electrolysis cells for small-scale production of sodium hypochlorite from saltwater made clean water available in the poorest regions. Alternatives included on-site acidification with aluminum potassium sulfate, flocculation and sedimentation, generation of iodine and mixtures of oxidants, purification with copper sulfate, and sand or cloth filtration.

Modern Concerns

Late in the twentieth century, the Asian media advanced a range of sanitation concerns. Already leery of food contamination after 12 schoolchildren died of hemolytic uremic syndrome and 10,000 fell ill with diarrhea from *E. coli* between May and August 1996, Japanese shoppers panicked in June 2000 from a series of threats to safe foodstuffs. The dairy market weakened because 14,800 milk drinkers sickened from *Staphylococcus aureus* infections after consuming out-of-

date Snow brand milk products recycled in Taiki, Hokkaido, as fresh yogurt and low-fat milk. More alerts surfaced to flies in canned juice, lizards in potato chips, and wormy pastry. Deputy Health Minister Yutaka Fukushima, a physician from Kyoto, declared impurities the result of apathy and sloppiness.

As consumer trust faltered, the Japan Food Hygiene Association reported recalls throughout summer 2000 of Kikkoman tomato sauce and pasta sauce sabotaged with glass shards and Yakult Honsha fruit juice permeated with plastic bits. *Yomiuri*, Japan's largest newspaper, polled 1,983 readers and found that over half feared food poisoning for themselves and their families. Trust in factory hygiene fell to 55 percent; faith in safe drinking water sank to 46 percent. The Japanese Consumers' Cooperative Union's spokesman, Kazuya Fujiwara, attempted to restore faith in purity standards by discrediting the scare as media hysteria. Writing in the *Weekly Tokyo Keizai* magazine, Keinosuke Ono, professor of business at Keio University in Tokyo, surmised that unconscionable corporate principles permeated the food industry.

Other industrialized nations faced difficulties in maintaining purity standards. In summer 1991, *Salmonella poona* from Texas cantaloupe and tomatoes caused extensive food poisoning in 23 states, Newfoundland, Ontario, Quebec, and Saskatchewan. Importers crossed borders with impunity, spreading contamination from the Rio Grande northward and exposing kitchens to contagion from one of the continent's most polluted areas. American methods of insect control with the electric bug killer fell into disfavor in the late 1990s from studies indicating that the electrified cylinder killed beneficial insects as well as pests and exploded their bodies over people, outdoor tables, and uncovered food and drink at parks, outdoor cafés, and campsites.

Homemakers countered invisible impurities with inline water filters, spray cleanser for eggs and produce, and sterilizing dishwashers. In 1993, Dean O. Cliver and Nese O. Ak, microbiologists at the University of Wisconsin at Madison, determined that wood is a better material for cutting boards than plastic or glass. Their experiments proved that pathogens such as *E. coli*, listeria, and salmonella grew less rapidly and died quicker on wood than on knife-scored plastic cutting boards. They found glass dangerous because users may embed tiny shards in food.

Ecological disaster posed additional threats. A lethal food scare aroused

Romanians northeast of Bucharest in January 2001, after 30 people from an impoverished area suffered cyanide poisoning from contaminated fish. The threat became obvious when thousands of dead fish surfaced in the Siret River after a cyanide spill at the Metadet chemical company. Health Department head Nicolae Trinca fined Metadet \$800 and confiscated and burned tons of fish. Poor and unemployed peasants ignored warnings of gastritis and kidney damage by selling the tainted catch and serving it at their own tables.

Other sanitation concerns involved herd health and the edibility of animal products. In Europe, the double blow of hoof-and-mouth and mad cow (or Creutzfeld-Jakob) disease—bovine spongiform encephalopathy in beef resulting in an irreversible brain erosion—dramatically changed shopping and dining habits. The mad cow scare began in England in March 1996. Home cooking resulted in 90 deaths from brain deterioration, causing the meat market to plummet. In another incidence of public panic, French markets stopped selling beef intestines and sweetbreads (thymus glands) because of a rise from 31 incidents and two deaths from mad cow disease in 1999 to 90 infections in 2000. School cafeterias stopped serving beef from any source.

In April 2001, the United Kingdom continued battling herd infection with hoof-and-mouth as it spread unabated in northern England, Scotland, and Wales and cropped up as far away as Hong Kong. Wholesale extermination and burning of infected animals and those exposed within a 10-mile (16-kilometer) radius drained the finances of farmers and dairies. To avoid mad cow, housewives and restaurateurs shifted traditional beef-heavy shopping patterns to chicken, fish, horse meat, lamb, and exotica—crocodile, emu, kangaroo, ostrich, and whale. While panic spread to Germany and the Azores, beef disappeared from plates at home and in military camps and schools throughout the European Union.

Advanced Sanitation Methods

The status quo in food purity currently relies on more inspections and cautions. Conventional farmers replaced the fungicide copper sulfate with strobilurin-based sprays, synthetic fungicides that broke down readily and posed almost no danger to living things. Out of concern for the environment and human well-

being, organic farmers backed rotenone, an organic pesticide extracted from custard apple, hoary pea, and jewel vine. Growers routinely sprayed it on fruits and vegetables and on lakes and ponds to kill Asian carp, a scavenger fish. Homeowners applied rotenone to eliminate pests on their pets and kill fire ants.

The World Health Organization declared rotenone hazardous and mildly toxic to mammals. Without government prompting, the makers of the pesticide voluntarily withdrew it from use on cereal crops, cranberries, and tomatoes. In 2005, the U.S. Department of Agriculture's (USDA's) National Organic Program prohibited rotenone from any foodstuff labeled "organic." In 2011, the U.S. National Institutes of Health confirmed a link between rotenone and Parkinson's disease, a neurodegenerative disorder that frequently disables farmers. Health Canada followed the United States lead in condemning the pesticide.

The issue of food irradiation with low-dose gamma rays surfaced late in the twentieth century as a major concern of food purists. Alarmists ignored the fact that the Massachusetts Institute of Technology had introduced the purification method in 1904 and applied it to U.S. Army rations in 1943. In intensive care wards, hospital cooks routinely serve irradiated food to patients with compromised immune systems. Consumers and government officials studied the development of irradiation on highly storable grains and beans and on meat and poultry to kill common insects and microbes. The technique suppressed bacteria and viruses and inhibited the sprouting of garlic, onions, and potatoes, thus extending their shelf stability. In opposition, the Organic Consumers Association in 2001 rejected any artificial sterilization out of fear for long-term dietary hazards and birth defects in the unborn. In July 2011, the USDA's Food Safety Inspection Service denied a request from the American Meat Institute to halt full disclosure to consumers of beef and poultry irradiation.

See also: Coprolites; Ice; Inspection and Safety, Food; Poisonous Foods; Pork; Rumford, Count; Water; Wine.

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Sauces and Saucing

The culinary application of creamy, liquid, or thick toppings or side dressings to foods embellishes moisture, taste, and visual aspects of table presentations. Ethnic specialties gain authenticity from the distinct flavor and character of a slow-simmered dressing. Examples include hoisin (sweet potato) sauce on Chinese beef, mayonnaise on Irish egg mayonnaise, mint sauce on English lamb, *pico de gallo* on Tex-Mex taco salad, plum sauce on Chinese American spring rolls, Salsa Lizano on Costa Rican tamales, *sofrito* on Cuban beans, and teriyaki (sweet soy sauce) on Japanese *yakitori* (skewered chicken, beef, or seafood).

Saucing is an ancient kitchen art that began as the preparation of gravy or marinade for direct moisturizing of spitted fish and meat. Mustard, added to curry at the Mohenjo Daro settlement in the Indus Valley as early as 4000 B.C.E., required macerating in a mortar to release piquant fragrance. Egyptian funerary art illustrated from 3000 B.C.E. the sharing of gravy by diners as an entrée dressing. Around 2800 B.C.E., Chinese cooks fermented soy sauce as a distinctive entrée base or topping.

Ancient Romans first turned saucing into a culinary art by importing *salsa verde* (green sauce) from the Near East. To vary an insipid diet of pulses, cooks upgraded the basic parsley and vinegar blend with anchovies, capers, and oil. Kitchen skill advanced to kitchen business by the processing of vats of *garum* (fish sauce) into a culinary topping, which may have been a recipe from the

Phoenicians of the 700s B.C.E. or the Greeks of the 400s B.C.E. Romans applied the ready-to-eat fish pickle to casseroles, porridge, even beverages.

Garum

For up to nine months, sauce makers fermented fish blood, entrails, gills, and heads in saltwater at a ratio of one to eight to produce a protein-rich *salsamentum* (condiment). By recycling the discarded organs of anchovies, eel, mackerel, mullet, sprats, tuna, and wrasse in a mix with salt, garum makers turned a table condiment into a profitable processed food for sale to fast-food counters, the Roman army, Greek and Roman healers, and Mediterranean grocers. For flavor, preparers added celery, coriander, fennel, mint, and oregano.

After the 400s B.C.E., manufacturers processed for export a series of garum spin-offs—*allec* (fish liver paste), *hydrogarum* (diluted fish sauce), *liquamen* (pickled whole fish sauce), *meligarum* (honeyed fish sauce), *muria* (low-quality tuna garum), *oenogarum* (peppery Byzantine dressing thinned with wine), and *oxygarum* (a vinegary garum). The highest grade consisted solely of tuna blood; the most savory, of mackerel liver. Because Jews banned garum for its disgusting source, ancient sources imply that manufacturers fermented *garum castimoniale* (kosher fish sauce) that obeyed biblical proscription against fish without scales.

By 37 B.C.E., fish sauce fermentation extended to Baelo Claudia, Cartagena, Gades, Malaga, and Tarifa in south-coastal Hispania, from which port cities ships carried sealed amphorae to Chester and Londinium in Britannia. In the decade following 60 C.E., Aulus Umbricius Scaurus and his son managed a successful mackerel sauce factory in Pompeii that shipped branded goods to Spain. The best-quality garum, according to encyclopedist Pliny the Elder, cost 166 sestertii per pint, more than an army recruit earned in eight weeks. Other flavored fish sauces derived from Aila, Jordan; Correiros, Setubal, and Troia, Portugal; Cotto and Lixus, Morocco; and Leptiminus and Neapolis, Tunisia. In 212, the Emperor Caracalla levied a 2.5 percent tax on imported garum.

During the legionary occupation of North Africa, Roman cuisine also produced *epityrum* (olive relish) and *moretum*, a spread for bread made from garlic, herbs, and sea salt crushed into fresh cheese. The recipe, enhanced with basil, hard

cheese, olive oil, and pine nuts, resulted in pesto, a bright green sauce that medieval Ligurians served over pasta or added to soups. The complex flavors of pesto suited recipes to the west, including Argentine, Peruvian, and Provençal sliced beef and potatoes.

Medieval Innovations

In the early Middle Ages, European chefs dressed meat and fish entrées with creamy British bread sauce and French tartar sauce (egg and wine dressing) thickened with arrowroot, blood, butter, cornstarch, cream, eggs, mustard, potato or rice flour, or roux. *Probeat*, Latin for “Let it prove,” a spiced apple and raisin dressing, enhanced roast beef. Another sauce, goose milk, involved the flavoring of goose drippings with ground almonds and coloring the mass with saffron for pouring over roast goose.

At abbey hearths, monastic cooks blended ale into egg yolk for caudell (or caudle) to pour over plum pudding and stirred fatty drippings into coulis, a thick puree of fish, fruit, herbs, or vegetables, for example, crayfish, raspberries, parsley, or turnips. In “Balade to Rosa-monde” (1386), English poet Geoffrey Chaucer specified *galantyne*, a sauce made from bread crumbs and pounded galyngale, aromatic ginger root, for flavoring eels, pike, and plaice. Britons, Germans, and Scandinavians topped cold meats with creamed horseradish, a peppery, vinegary sauce that Central European Jews applied to gefilte fish.

At Hispaniola and Jamaica after 1492, Genoan navigator Christopher Columbus observed the saucing of barbecued chicken and pork with a liquid dressing that natives stirred from spice, sweetener, and tomato into vinegar. When Renaissance encyclopedist and linguist Bernardino da Sahagún, the “Father of Ethnography and Culinary History,” first viewed Mexican saucing at Xochimilco, he admired the savor of sauced finger food sold in the markets and extolled the *moles* (sauces) that flavored cayman, crayfish, dog, jackrabbit, quail, and lake and sea fish. In Argentina, Brazil, Chile, Colombia, Nicaragua, Paraguay, and Uruguay, Spanish conquerors observed an inland *asado* (barbecue) basted with *chimichurri*, a garlic, lemon, onion, parsley, pepper, and salt marinade, or with a vinegary Creole sauce blended from onions and tomatoes.

Recipes

Formal recipes for sauces began appearing in cookbooks during the late Renaissance. After 1620, New England immigrants dressed boiled dinners with mustard and vinegar and made Old World bread sauce and New World cranberry sauce. Pilgrims sweetened the bright red “bounce berries” by jellifying them in maple syrup. Newcomers learned the cranberry jelly recipe from the Wampanoag Indians for icing cakes and for serving on mutton, pork loin, turkey, and venison, a model for subsequent Thanksgiving celebrations. Shaker cooks at New Lebanon, New York, and Sabbathday Lake, Maine, altered the red sauce into a ketchup.

Settlers of the Amana colonies in Iowa and the Dutch villages of New York enjoyed horse radish dressings blended with hot beef stock or dried lovage and oregano. A recipe recorded by country wife Abigail Adams of Braintree, Massachusetts, called for the saucing of freshly ground horse radish with heavy cream and mustard for moistening beef brisket. In Iowa, horse radish combined with celery and mustard seed for a piccalilli dressing, which cooks preserved in stone jars. On South Carolina plantations, according to *The Receipt Book of Harriott Pinckney Horry* (1770), horse radish filled an essential part in flavoring meat. Unlike New England sauces, recipes from Texas and Virginia described a more emulsified state with the addition of butter and egg yolks.

In the 1600s, French cook Philippe de Mornay, prime minister under Henry IV, expanded white sauce into *chasseur* (brown sauce), *lyonnaise* (onion and vinegar marinade), *Mornay* (cheese sauce), and port sauce made from Madeira or ruby port. All Mornay’s inventive recipes enlivened meats and green vegetables. Game and pheasants profited from a fragrant *chasseur* made from mushrooms and shallots in wine.

Another seventeenth-century favorite, *béchamel* (white roux), invented by Louis de Béchamel, head steward to Louis XIV, or by the king’s chief chef and French food maven, Pierre La Varenne, flavored dried cod, a pantry staple throughout Europe. In 1651, La Varenne systemized the principles of regional fare and standardized ingredients for *béchamel*, a rudimentary *hollandaise* featuring creamery butter, and a *Barbe Robert* (or *soubise*), a blend of fried onions, mustard, verjuice, and vinegar for topping duck, eggs, fried fish, and rabbit. In

Tudor England, the drizzling of such fine sauces over entrées received applause as the height of gustatory pleasure. Navigators returning from East Asia contributed an unforeseen twist in soy sauce, an East Asian puree, which the Chinese first made in 800 B.C.E. and bottled commercially in the 1690s. In 1737, the Dutch East India Company purchased 75 barrels of soy sauce at Dejima, Japan, for supplying Javanese kitchens.

Food historians date mayonnaise to June 29, 1756, when the chef of the Duke of Richelieu transformed velouté (blond sauce) by emulsifying egg with olive oil. The unidentified innovator called his creation “mahonnaise” for Mahon, Minorca. In Belgium, Germany, Holland, and Russia, regional adaptations with anchovies, capers, curry, lemon juice, paprika, pepper, sea salt, and sour cream deepened the flavor of mayonnaise for enhancing beef, crab, eggs, hake, and pork. Similarly impromptu, oyster sauce derived from an accidental reduction of oysters into a brown dressing in Guangdong, China, by café cook Lee Kam Sheung in 1888. The sauce added complex aromas and flavors to Buddha’s delight, a popular rice and vegetable mélange.

In the 1890s, Georges Auguste Escoffier presented hearty dishes sauced with a distinctive béchamel or velouté. To basic dressings, he added hollandaise, a thick topping of clarified butter, egg yolk, and lemon juice, and tomato sauce for serving over asparagus. In the mid-1820s, chef Marie-Antoine Carême added baroque touches to French cuisine to harmonize rather than mask flavors. He categorized the four foundations or mother sauces as béchamel (white sauce), espagnole (brown ham sauce), hollandaise (butter sauce), and velouté.

See also: Condiments; Chutney; Dutch East India Company; Grilling; Ketchup; Mustard; Roman Diet and Cuisine, Ancient; Theophratus.

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Sausage

A convenience food from early times, sausage combines brining, curing, drying, salting, fermenting, pickling, and smoking as methods of preserving meat for storage. Neolithic meat hunters preserved the tidbits left over from butchery by stuffing it into animal bladders, feet, intestines, and stomachs. These natural pockets held a mix of blood, kidney fat, and fish, meat, or poultry offal, including gristle and rind. The casings, scraped and defatted, absorbed spices and smoking and secured the meat mix for travel meals. Sumerian pastoralists adopted sausage making in 4000 B.C.E. as a storage method. Babylonians recorded blends of herbs and chopped meat for sausage in 1750 B.C.E.

Among ancient Asians, Celts, Germans, Greeks, Romans, and Slavs, the resulting blood pudding, bologna, frankfurters, haggis, kielbasa, and salami extended the edibility of the hunt in some of the world's oldest recipes. The Viennese produced the *wienerwurst* or Vienna sausage, the derivation of the term *wiener*. The Chinese commented on *lap cheong* sausage in 589 B.C.E., when cooks saved fatty pork, blood, and poultry liver to mix with rice wine, soy sauce, sticky rice, and vodka for boiling and steaming. Thai sausage makers relied on banana leaf wrappings as casings for meat fermented by natural microorganisms.

Romans valued savory blends of forcemeat pounded into a paste in a mortar with honey, mustard, and vinegar. They made plain sausage as an on-the-march food for armies, such as the occupation force of Verulamium, England, home of a meat-processing factory. In the late republic, a favorite, *lucanica*, from southern Italy fed soldiers and slaves on links flavored with bayberry, cumin, *liquamen* (fish sauce), parsley, pine nuts, rue, and savory. Mid-February celebrations of Lupercalia incorporated myrtle-spiced sausage into fertility rituals. To standardize taste, meat processors kept part of the previous batch, thus salvaging the natural flora of their butcher shop.



German sausage makers stuff traditional *weisswurst* (white sausage)—ground veal, pork, and spices in casings. Literally thousands of German sausage varieties come in three categories: scalded, cooked, and raw. (Heribert Proepper/Associated Press)

By the first century C.E., charcutiers the world over industrialized traditional home meat processing. The Roman Apicius's *De Re Coquinaria* (*On Cookery*, ca. 35 C.E.) enumerated sausages made from chicken, fish, peacock, pork, and shellfish and one variety stuffed into an animal womb. In the same era, Korean gourmards relished *soondae*, a course-ground sausage made with *kimchi*, noodles, pollock, and squid and forced into pig intestines or drum fish air bladders. Japanese version featured ground fish.

Medieval homemakers chopped meat and fat for bulk sausage, which they stored in clay pots and sealed with melted tallow for spring house storage. For longer preservation, they poked shredded meat through greased funnels into thin casings, tied them into serving-sized links, and smoked them. Dutch, Germans, and Poles specialized in *bloedworst* and *blutwurst* (blood puddings), a congealed blend mixed with horse meat, bacon, or suet and thickened with barley, chestnuts, oatmeal, pine nuts, rice, or sweet potatoes. Brussels fish sausages satisfied the need for a meat-free entrée during Lent.

Thirteenth-century Andalusian and Saharan writings list the combination of animal giblets and glands with almonds, clove, pepper, and sugar. In Palermo,

Sicily, in 1415, house wives bought fresh sausage from itinerant vendors hawking fresh links made from ox tongue, pig's brains and spleen, sheep's lungs, tuna, and wild boar. Italian cooks chose from a variety of flavorings— anise, cheese, cinnamon, citrus rind, clove, garlic, ginger, juniper berries, leeks, olives, pumpkin, red wine, and raisins. Antipasti featured sliced cold cuts, notably pancetta, a cured bacon rolled into a cylinder and pressed to remove air pockets.

Monks often collaborated with farmers to turn tougher, unattractive animal trimmings into economical meats. Bavarian Benedictines of Andechs, outside Munich, Germany, specialized in *weisswurst* (white sausage) and *saumagen*, a pork-and-potato blend pressed into a muscular pig's stomach and eaten with sauerkraut. In 1493, the refectory of St. Swithun's in Winchester, England, served morterells, sausage balls flavored with cinnamon, paprika, and parsley and fried in lard. During the 1500s and 1600s, imported herbs and spices, such as cardamom, coriander, allspice, and nutmeg, added new possibilities for dry forcemeat. Because dry mutton and oyster sausage required no refrigeration, it stocked the larders in ships and military kitchens.

Idiocuisine preserved the name of locales, as with Cumberland sausage in England; Lebanon bologna; Asturiana from Asturia, Spain; and salami from Salamis, Cyprus. Berliners and frankfurters from Berlin and Frankfurt, Germany, added popular export items to the country's 3,000 sausage varieties. Artisanal recipes became clan heritage and passed into the kitchens of family specialists. When immigrants moved to the Western Hemi sphere in the 1700s and 1800s, they brought along wooden box grinders that reduced meat trimmings to the right viscous mass for stuffing with wooden plungers through tin nozzles into casings.

Latin American chorizo and *morcilla* differed from their Central European cousins in the addition of hot peppers and thyme and the wrapping of hot sausages in tortillas. Algerians and Moroccans air-dried *merguez*, a blend of beef and lamb flavored with chili, paprika, and sumac and stuffed into lamb intestines for serving with couscous. South Africans turned game into *boerewors*, a farmer's sausage made from chopped beef or game, seasoned with coriander and vinegar, and barbecued on a grill. Similarly, Australians ground kangaroo meat into mince for sausage. American soul food featured pork ground with salt and sage for a meaty additive to scrambled eggs and pancakes.

See also: Creole Diet and Cuisine; Heritage Foods; Idiocuisine; Pemmican; Pork; Travel Food.

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Scandinavian Diet and Cuisine

In Iceland, Denmark, Norway, Sweden, and Finland, Nordic pantry staples favor locally sustainable foods that grow in a harsh periarctic climate. Forests yield mushrooms for salads and reindeer for roasting. Fields of rye and fisheries processing a fresh catch produce the pickled herring on rye bread that accompanies blue-shell mussels and gravlax.

Because of severe weather and weeks of home-bound activity, Scandinavians demand tasty, interesting meals. Savory specialties—rosehip soup, blood pudding, aquavit, yogurt, rhubarb, sourdough bread, jellied eel, and cloudberry jam—derive from recipes dating to the Vikings. Condiments tend toward beet pickles, horse radish, capers, mustard, and balsamic vinegar rather than sugary ketchup or cream-and roux-based French sauces.

From early times, the aboriginal Sami based their meat consumption on reindeer. Vigorous Scandinavian hunter-gatherers embraced a high-protein diet of bear, boar, deer, elk, goat, hare, horse meat, musk ox, puffin, seal, and walrus, which they obtained with spears or bow and arrow. In anticipation of a long winter, preparers salted, air-dried, or smoked moose haunches, whole fish, and sausage. Coastal scavenging netted auk, oysters, mussels, grouse, waterfowl eggs,

and whale meat. Sailors recognized the value of dulse and scurvy grass, which prevented bleeding gums and loose teeth.

Around 900 C.E., the Vikings gathered at the fire pit for two daily communal meals, eaten from wooden trenchers with spoons and knives. Kettle cookery in iron or soapstone cauldrons or animal pelts required the placement of heated rocks in the liquid, such as black soup, a blend of pig and goose blood. More delicate meats, such as lamb and seabirds, hung from the long house ceiling in a constantly smoky atmosphere.

Diners interspersed spitted meat, egg, and milk dishes with Arctic bramble, onions, elderberries, wild crab apples, sloes, nettles, hops, hazelnuts, and ground elder, a spring leaf vegetable and potherb. For winter rations, cooks made fresh cheese and submerged butter and mutton in sour whey. For beverages, they sipped myrtle-flavored ale, fruit wine, or mead from wooden cups and horn tankards. For travel, sailors stocked ships with salt herring, *stokkfisk* (dried cod), and lutefisk (lye-cured cod) for ready meals and trade items. The seafarers bartered their preserved fish as far from home as Baghdad in exchange for grape wine, figs, almonds, capers, mustard, fennel, and spices.

As agrarianism took hold in the colder climates, domesticated barley yielded a grain suited to steaming, fermenting into ale or beer, or grinding into flour. Norwegian women kneaded whole grain dough into *lefse*, a crepe prepared once a year for packing in barrels or sea chests and consuming with beer. To preserve ducks, geese, and herring, preparers plunged them into brine and added saltpeter as a stabilizer. Danes served pickled goose with yellow pea soup, a puree of peas, carrots, parsnips, and leeks. A favorite dressing combined horse radish with whipped cream sauce.

In the late Middle Ages, grain failures caused Scandinavians to double the amount of meat in their daily intake. Root vegetables anchored the military breakfast of egg and meat hash. Orchards produced 200 apple cultivars for baking and smoking. Cooks refined farmyard ingredients into porridge with whey or buttermilk and cured salmon, both remedies for dreary winter days. Cloudberries in liqueur and preserves treated gout and scurvy.

The introduction of new foods and kitchen methods made slow inroads onto the Scandinavian table. Sugar arrived in 1324 but influenced only the diet of the wealthy. By the 1500s, pie making augmented simpler methods of presenting

meat and vegetables. The smorgasbord, a buffet of hors d'oeuvres, evolved in 1650 with a variety of flavors and textures sampled before a formal dinner or in hotels as light meals. In the late 1700s, potatoes became a focus of meat and vegetable soups and stews. French and Russian influence added crepes and blini to traditional dessert choices of fruit soup, berry mousse, and *romfromage* (rum meringue).

Currently, Nordic appetites tend toward hearty fiber foods, such as mackerel or trout chowder with oat or spelt bread, which keep Sweden's obesity rate at 10 percent. For flavoring celeriac, salsify, Icelandic moss, turnips, cauliflower, and boiled potatoes, cooks make liberal use of angelica, dill, fennel, juniper berries, parsley, and thyme. For braising meatballs to serve with brussels sprouts, cabbage, or kale, restaurateurs choose rapeseed oil, a deviation from the European preference for olive oil. Desserts incorporate blueberries, cowberries, and lingonberries in light, creamy combinations.

With the opening of the Noma restaurant in Copenhagen, Denmark, in 2003, Western chefs took notice of the Nordic diet, a heart-healthy cuisine rich in omega-3 fatty acids, fiber, and antioxidants and low in processed foods and saturated fats. The Scandinavian preference for local, seasonal, and organic produce, such as the ingredients in fish kebabs, potato pancakes, moose tournedos, and sweet pea soup, interested ecologists and proponents of the healthful food movement. Critics of the wholesale adoption of traditional Nordic gastronomy warned that the sodium in salted foods increased the risk of stomach cancer, stroke, and elevated blood pressure.

See also: Beer; Cod; Kitchen Gardening; Pan-European Diet and Cuisine; Swedish East India Company; Wheat.

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Seacole, Mary Jane (1805-1881)

One of history's first military dietitians, Mary Jane Grant Seacole, a Creole herbalist from Kingston, Jamaica, practiced culinary and healing arts in Central America and on the battlefields of the Crimea.

She was born to Captain James and Jane Grant, a Scots officer of the British army and a Jamaican healer. In addition to learning how to simmer fruit into jam and to pickle fruit and vegetables, she began an apprenticeship in folk medicine at age 12. Period curatives involved boiling thistle seed for diarrhea, chopping water lily root into a gut-soothing beverage, collecting fig sap for stomach ache, pressing plantain juice for internal bleeding, and steeping ginger tea and lemongrass to control malarial fever. After completing her education, she traveled to London and sold West Indian pickles and preserves.

After the death of Seacole's husband, Edwin Horatio Seacole, in 1844, she operated the British Hotel in Las Cruces, Panama, for convalescent sailors and soldiers. While studying the healing methods of Cuba, Haiti, Nassau, and Panama, the revered "yellow doctress" acquired experience treating cyclical cholera and malaria outbreaks. Her home remedies included emetics, a soothing drink of cinnamon water and "sugar of lead," mustard plasters, and massage with camphor, oil, and wine. In making and administering African and West Indian cures, she contracted cholera but recovered.

After battling yellow fever in Jamaica in 1853, Seacole studied medical techniques in Colombia, learning dietary treatments for scurvy. The next year, she volunteered for the British army nurse corps at the London War Office but received a chilly reception from the all-white staff. Adamant about serving, she booked passage on the Dutch steamer *Hollander* to Turkey. At Florence Nightingale's Barracks Hospital at Scutari, she toured the kitchen, where cooks were preparing the arrowroot pudding, broth, and soups that strengthened the wounded.

On the southern coast of Russia along the Black Sea, Seacole arrived in time to

witness heavy losses among the allies. Quartered on the ammunition ship *Medora*, she began bandaging wounds, setting broken bones, and prescribing special diets for casualties whom medics carted to the pier at Balaclava for boat transport to Scutari. Like Florence Nightingale and military chef Alexis Soyer, Seacole felt traumatized by the carnage, but she continued to stuff her backpack with bread, cheese, and cold meats along with spirits and wine and the medicines she mixed in her pharmacy. She stiffened her spine against the mockery of British doctors and smuggled brown bread past Sevastopol sentries. On her portable kettle and field stove, she cooked blancmange and plum and rhubarb pudding, flavors from home. During heavy combat, she evacuated 200 patients to Scutari. Throughout, she managed a cheery countenance and kind demeanor that earned her the name “Mother Seacole.”

In summer 1854, Seacole purchased the British Hotel at Spring Hill south of Balaclava and operated it as a hostel and rehabilitation center for English, French, and Sardinian patients. She baked bread, cooked fruit and root vegetables, made dumplings and stew, roasted mutton and bustards, and served claret punch and rice pudding. Simultaneously, her kitchen turned out the current jelly, egg dishes, herbal tonics, and teas needed for medical treatment. On August 16, 1855, she rode horse back to the front at the battle of Tchernaya to treat casualties in trenches. In September, she witnessed the fall of thousands at the Siege of Sevastopol, where she fought off sentries who tried to return her to safety at the guard house.

Throughout her service to the military, Seacole had to pay for her own supplies, some of which she imported from London pharmacy houses. Thus, the melding of an inn and buffet with nursing provided her with cash for ban dages, drugs, and transportation. On earnings from catering, she operated a lab for mixing medicines, sterilized water for washing the wounded, and cooked a daily supply of hot, fragrant herbal elixirs for victims of blood loss and frostbite. While contending with cholera, diarrhea, jaundice, and pneumonia, she spoiled the weakened men with fruit jelly, sherry, soup, and sponge cake. Her military decorations included the British Crimea Medal, the French Legion of Honor, Russian and Sardinian decorations, and the Turkish Order of Medjidie, but she received no remuneration for her charity.

After the restoration of peace in the Crimea in 1856, Seacole sailed for England.

Her financial state prevented an immediate return to Jamaica. Admirers reading of her courage and selflessness in *The Illustrated News*, *Punch*, and the *London Times* donated funds to repay her for volunteering and for financing a dietetic kitchen and dispensary. To recoup some of her losses, she wrote *Wonderful Adventures of Mrs. Seacole in Many Lands* (1857), Britain's first autobiography composed by a black female.

Much loved by allied soldiers whom she fed and tended, Seacole died of stroke and received military honors at her burial in Kensal Green, London, in May 1881. Posthumous awards include a statue at the Institute of Jamaica and the Order of Merit, awarded in 1990, and, in 2008, acclamation as the Greatest Black Briton.

See also: Mustard.

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[Seaman's Diet and Cuisine](#)

From the earliest times, the menu for oceangoing crews fit the limitations of availability, price, and stowage. Ship's biscuit, or hardtack, served Egyptians, Romans, and crusaders because of its dehydrated constitution of flour and water and its lengthy survival of dampness and weevils. Bronze Age Greek sailors varied their bread diet with almonds, figs, raisins, and seeds. The crews of Chinese junks subsisted daily on 2.2 pounds (1 kilogram) of salt cod or herring and pork, 1.8 pounds (800 grams) of rice, 3.5 ounces (100 grams) of preserved cabbage, and 3.2 quarts (3 liters) of tea. The Indian sailor had less to look forward

to at mealtime except plates of dal and rice topped with ghee (clarified butter).

For the French, ship life exposed the crew to filth and poor ventilation. The worst hardship, drinking water gone fetid in wood casks, required the addition of ale or spirits to kill algae. The lucky seaman caught fish or seabirds as a break from stowed supplies but still suffered the effects of limited calcium and potassium and deficiencies of vitamins A and C. Poor hygiene and limited diet left men vulnerable to typhoid and typhus, which rapidly undermined a fleet's fighting strength.

Varied Pantries

In the great era of sea exploration, ships' pursers broadened pantry lists with global stock as well as short-term fruits, milk, and vegetables. However, the common seaman's fare never compared to the menus of the officers' mess. In 1519, the invasion of Hernán de Cortés on the Aztec of Mexico required provisioning at the embarkation point in Cuba. For the voyage, the ship occupied by soldier-turned-chronicler Bernal Díaz dispensed anchovies, bacon, biscuits, cassava flour, cheese, chickpeas, onions, salt pork and fish, sardines, and wine. A downside to unpalatable cuisine, the consumption of grog (watered ale or rum) increased during lengthy voyages, precipitating alcohol abuse and alcoholism.

On voyages to Brazil, Guinea, and India in 1600, Portuguese mariners received measured amounts of biscuit, dried cod, olive oil, salt meat, vinegar, water, and wine. In addition, the ship's cook laid in stores of almonds, garlic, grain, honey, lentils, mustard, onions, prunes and raisins, salt, sardines, and sugar. They reserved the dried fruit, honey, and sugar for sailors in sickbay. Civilian passengers provided their own foodstuffs. The purpose of carefully allotted staples was the avoidance of fighting with pirates during calls to port.

During layovers for new stores of cod and meat, sailors had time to fish on their own and to barter for fresh produce and healing herbs. Before the discovery of vitamin C, concern for epidemic scurvy encouraged English captain James Lancaster to dose sailors for the East India Company each morning with three spoonfuls of lemon juice. In 1634, the Danish East India Company (*Dansk Østindisk Kompagni*, or *OK*) equipped the *St. Anna* for a run from India to

Copenhagen. In addition to the usual victualing with biscuits, dried cod, and salt beef and pork, company director Willem Leyel fought ennui and scurvy with stores of barley, beans, butter, brandy, ham, horseradish, lemon juice, prunes, smoked ox tongue, and vinegar. A fellow OK shipper loaded the *Gilded Sun* with sauerkraut, a known antiscorbutic.

Under the direction of naval provisioner Samuel Pepys in 1667, the British navy provided nourishing but monotonous fare for its recruits. The official weekly allotment consisted of 7 pounds (3.2 kilograms) of biscuit, 6 cups (1.7 liters) of oatmeal, 4 pounds (1.8 kilograms) of salt beef, 2 pounds (900 grams) of salt pork, 3 cups (0.8 liters) of peas, 4 ounces (113 grams) of cheese, and 3 ounces (85 grams) of butter. Because a galley lacked both grill and oven, cookery consisted of boiling and limited desserts to boiled pudding. Sweetening came from cane sugar, dried currants, and raisins. An American sailor enjoyed some variation of the British diet with the addition of dried onion, potatoes, and turnips. For professional sailors on voyages to the Arctic regions, more than half their caloric intake came from ale, liquor, and wine.

Malnutrition

Lengthening voyages increased the incidence of scurvy, a perpetual threat from the late sixteenth to the late nineteenth century. The silent killer robbed sailors of energy and precipitated bleeding gums and painful joints. By the onset of such symptoms as convulsions, fever, and neuropathy, the illness was irreversible.

In 1620, Captain John Smith, the founder of Virginia, advised that ships' provisioners include lemon juice along with bacon, cheese, marmalade, mutton, and wine. Both the Dutch and Spanish, on voyages along the African coast, bargained with natives for lemon juice and syrup. During one voyage to Asia of the Dutch East India Company, the captain had to call to port to buy fresh produce and to hire crewmen to replace those dead of scurvy.

From 1768 to 1779, Captain James Cook lost none of the *Endeavour's* crew to nutritional ailments. He had his men collect berries and watercress, eat sauerkraut, and make spruce beer, an antiscorbutic known to Native Americans. Ship's botanist Joseph Banks added to the regimen scurvy grass and wild celery,

both herbs he believed beneficial to sailors' health and performance. Late in the eighteenth century, the addition of sauerkraut to standard galley supplies prevented large-scale scurvy.

By the mid-1800s, sailors enjoyed ale and rum as well as canned meats, a substantial break from salt beef and pork. During the American Civil War, cooks softenedhardtack in water and mixed the results with molasses and pork for a dish called dandy-funck. With adequate flour, kitchen crews also turned out duff, a floury pudding sweetened with prunes or raisins and boiled in a muslin bag. Before breakfast and after dinner, ships' stewards doled out 4 ounces (118 milliliters) of grog or, during combat, whiskey. When not engaged in sea skirmishes, men could count on coffee heated over steam boilers and sweetened with black molasses. Congressional action ended the grog ration on September 1, 1862.

The Japanese made similar progress for readiness on transoceanic missions by combating the disease afflicting 40 percent of their seamen. In 1884, Surgeon-General Takaki Kanehiro, director of the Tokyo Naval Hospital, eliminated beriberi by reducing rice intake and adding bonito, cabbage, canned beef, carrots, chicken, curry, daikon, egg omelets, greens, leeks, miso soup, pickles, potatoes, sardines, saury, seaweed, tofu, and yellowtail. Most significant to the upgrade, he changed staple purchases from polished rice to the unmilled variety, which contained vitamin B1 and prevented beriberi.

In 1889, Dutch physiologist Christiaan Eijkman furthered the study of beriberi on ships and in prisons of the Dutch East Indies by linking beriberi directly to a form of malnutrition. The mysterious ailment caused cardiac problems, neuritis, and paralysis. He earned a Nobel Prize in Medicine (1929) for identifying the missing nutrient as an unknown substance in bran, the pericarpium of rice.

The Modern Navy

After 1890, reforms of naval diet in the West, Russia, and Japan altered the philosophy of nutrition management. The French compared the food value of fresh and preserved meats on board ship; the Russians focused concern on the digestibility of salt meat and pickled vegetables. Another problem for Russian

recruiters, the hardiness of Finns and sailors from the maritimes raised the question of weaknesses in men from the country's interior, who did not thrive on the staple of cabbage soup with bread.

The 1910s increased medical awareness of essential vitamins. After World War II, military nutritionists determined that high-calorie dishes increased shipboard efficiency. Food quality made a difference in long-term wellness and the ability to throw off infection, especially for exhausted or injured sailors. In the 1930s, the Japanese equated supplying foodstuffs to the military with citizen patriotism.

World War II advanced concepts of naval readiness with added dairy, fruits, and vegetables to the seagoing diet. In 1942, the U.S. Navy ration included yeast and flour enriched with vitamin B1, iron, and niacin. The military also devised combat and survival rations for battle extremes, such as abandoning ship or lengthy bombardments. By 1960, installation of high-tech kitchens preceded the formulation of 1,300 recipes and upgrades to Navy cookbooks. To maximize storage, provisioners tested compressed, concentrated, dehydrated, freeze-dried, frozen, and precooked dishes. Sterilizers sanitized cookware and dishes to curtail the spread of contagion in below-deck surroundings.

Today, battleship crews meet on the fantail for cookouts and enjoy fad foods such as deli subs, fish and chips, pizza, and tacos. Mess halls extended breakfast hours and welcomed diners to a restaurant-style atmosphere and to "midrats" (midnight rations). For submarines as well as space missions, freeze-drying makes available cottage cheese, eggs, green peas, hamburgers, hotcakes, and pasta. Galley workers store additional canned food under floors in the passageways. For long undersea duty, appetizing meals rank high as morale boosters.

See also: Biscuit; Cook, James; Crackers; Gama, Vasco da; Ibn Battuta; Lapérouse, Jean François Galaup; Lind, James; Maritime Trade Routes; Polo, Marco; Pork.

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Seaweed

A seashore algae used to mulch plants and feed cattle and swine, seaweed also reinforces both forage diets and table cuisine. Coastal peoples worldwide value the 9,000 varieties of brown, green, purple, and red seaweed from intertidal zones for their health benefits and as a garnish and complement to national dishes. Native Tongans, who believed that sea vegetables increased longevity, used seaweed in rituals.

Like acorns, sea flora provided a dependable spring-to-fall crop for Native American foragers. Harvesters typically paddled boats to algae-infested shoals and waters and pulled up strands on grappling hooks. The Pomo of Northern California dried their haul on the beach to serve in tortillas or fry in oil. From the Pacific Northwest to British Columbia and Alaska, Haida cooks boiled seaweed with halibut as a relish.

In China in 600 B.C.E., a description of King Ding Wang's table named seaweed as a fitting herb for the elite diner. Chinese pharmacists shaped wet fronds into a poultice and turned brown strands of *Sargassum muticum* into a powder to heal respiratory ills. Cooks chose shelf-stable lengths of *kanten* (or *tengusa*) to make a savory sea gelatin or candy and to sauté in stir-fry or to replace edible bird's nests in soup.

Kombu or *kunbu* (*Saccharina japonica*, or kelp) influenced the cuisine of Australia, Canada, China, Japan, Russia, Scandinavia, South Africa, and Tasmania. From 400 C.E., the Chinese extended papermaking technology to seaweed. They dried it and stored it in strips. In powder form, they used it to make stock and thicken meat dishes, simmer with vegetables, or flavor rice with a taste similar to anchovies or caviar. At Amoy in Fukien Province, a regional

pancake secured cooked filling, seaweed, bean sprouts, and hot mustard or plum sauce for wrapping into handheld snack food.

Dulse (*Palmaria palmata*, a red algae) is another common sea edible in the North Atlantic and Northwest Pacific. In Iceland in the 900s, Norse chieftains favored dulse as a summer fiber food eaten fresh or dried. Scots ate dulse boiled in milk as well as steamed or grilled. The Irish preferred it in fish dishes and oatcakes and on potatoes. Healers recommended dulse in the diet for the fluoride content that prevented dental cavities.

Aquaculture in Australia, China, France, India, Indonesia, Japan, Korea, and the Philippines turned seaweed production into a food industry. The cultivation of nori (*Prophyra bangiaceae*), a red algae, occurred by accident in the early 1600s in Shinagawa outside Tokyo, where the shogun Ieyasu Tokugawa discovered seaweed growing on the fence around his fish farm. Although only ten varieties of algae dominated harvests, the Japanese increased their collecting to 21 strains of sea vegetables, which made up 10 percent of the diet from the eighth century until recently.

By 1900, the Japanese were harvesting enough sea vegetables from their 18,000-mile (29,000-kilometer) coastline to generate a \$2 million industry. The kanten variety purified sake, a native rice wine. To make seaweed fronds appeal to the public, Hokkaido processors boiled them in iron kettles filled with fresh water and green dye before drying them on bamboo racks.

Although Chinese immigrants to California began shipping *Ulva lactuca*, a low-fat, iron-rich green algae known as sea lettuce, from San Simeon Bay in 1869, mainland Chinese came late to the seaweed cultivation market. After discovering *dashi kombu* (*Laminaria japonica*) growing wild at Dairen, Manchuria, in the mid-1920s, propagators allowed the influx of spores from Hokkaido to flourish naturally. War time embargos in the 1940s forced the Chinese to build their own aquaculture floats. The effort spread from Shantung as far south as Kwangtung, employing 250,000 processors in growing six varieties of sea vegetables.

Methods of seeding algae simulated the planting of a field. Spores attached to ropes or in some areas growers blasted them on rocky coasts and reefs where they developed into fronds. Japanese food processors promoted the production of nori, the most abundant sea vegetable. Transported in bales and sold in sheets, it texturized soup, topped noodles, and wrapped sushi.

Today, the variety of seaweeds lends itself to numerous food needs. Since the rise of macrobiotic diets in the 1970s, Japanese restaurants have added sweet *wakame* (*Undaria pinnatifida*), a brown algae, to their tofu salads and miso soups. Australian and Tasmanian cooks blanch wakame to fry into chips or to complement the marine flavors of abalone, oysters, and steamed snapper. Dieters and vegetarians choose wakame and dulse as fat burners and blood and organ purifiers.

As a digestive aid and as a source of calcium, iodine, and magnesium, sea vegetables enhance the diet with flavor and nutrition. A fresh water alga, *spirulina* has shown promise since the early 1980s in Belarus, China, India, Mexico, Romania, Rwanda, Togo, Ukraine, and Zaire for the rescue of starving infants and children. Japanese children carry nori-wrapped rice balls to school for lunch.

Food processors sell popcorn, rice cakes, and other snack foods in seaweed flavors. Belize diners take their seaweed in a milk beverage flavored with cinnamon, nutmeg, and vanilla. Sea lettuce has value in East Asia, the British Isles, and Scandinavia as an antiscorbutic and a ruffled additive to salads. Toasted and broken into pieces, it becomes a sauce or soup component. In Hawaii, cooks

[Recipe: Welsh Toasted Laver](#)

Rinse and wipe clean six sheets of dried sea lettuce. Mix 2 tablespoons of sesame oil with a sprinkle of sea salt and coat the lettuce. Roll each sheet into a cigar shape and let rest for a few minutes. In a skillet, heat the rolled sheets separately until crisp. Chop into pieces to serve over rice or on bread with bacon and vinegar. The Irish also dress cold meat with laver, pepper, and vinegar.

use *ogonori* (*Rhodophyta gracilaria*), a red sea moss, in pickles and salads and add it to poke, a raw fish appetizer.

German beers incorporate agar, a seaweed extract in sweetening; a similar application in Holland flavors schnapps. Carrageenan (*Chondrus crispus*, or Irish moss), a red algae, and kelp (*Laminariales*) produce glutinous material for cottage

cheese, diet mayonnaise, dyes, gels, snack foods, and thickeners for coffee creamers, custard, ice cream, and soy milk.

In May 2011, Greenpeace reported that the tsunami off Fukushima, Japan, raised radiation levels by 50 times. Japanese diners on regionally grown seaweed could risk cancer from radioactive cesium and iodine.

See also: Japanese Diet and Cuisine; Kitchen Gardening; Monoculture; Tudor Diet and Cuisine; Wild Food.

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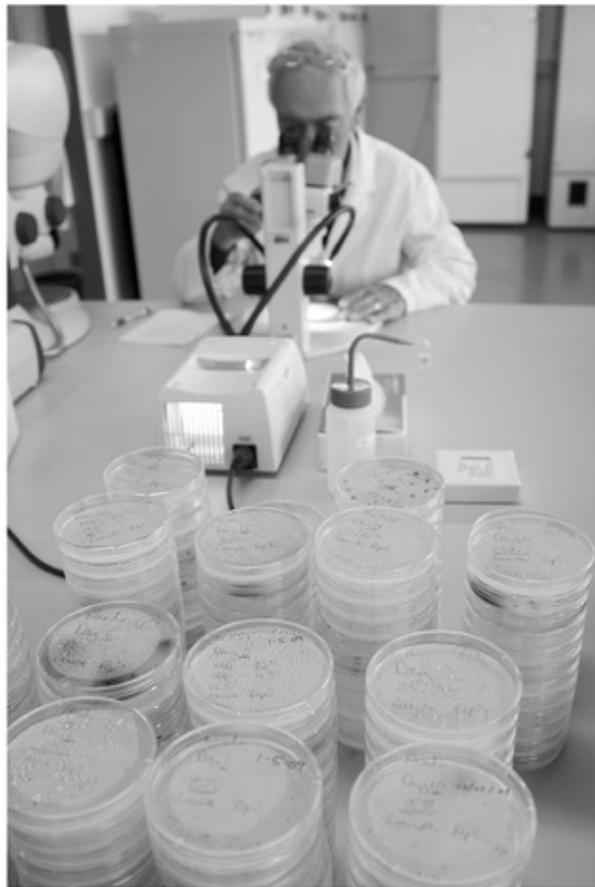
[Seed Trade](#)

Local and global seed exchange averts the potential extermination or extinction of world food sources. Trading protects the availability to growers of a range of seed families and alternative seed systems. Anecdotal advice and choices avoid the restrictions of government policies, which limit mixed cropping strategies. Village-based dispersal, such as that practiced in the Kurnool district of India and women's swaps of cassava cuttings in Amazonia, shields poor farmers from agribusinesses that threaten to displace family farms and livestock and to destroy autonomous cultures and their foodways.

International efforts, such as the Royal Botanic Gardens Kew Seed Bank begun in 1974, maintain and distribute samples from a span of wild populations in lush, semiarid, and dry lands. To stimulate biodiversity and plant reserves, British ethnobotanists abide by the principles of the United Nations Conference on

Environment and Development—the Earth Summit of 1992 and 2012 in Rio de Janeiro—which advocates eco-efficiency through wise use of seeds, energy, and water. The consortium gives a voice to the traditional farmer against the mounting dominance of botanical theorists and seed brokers.

In remote parts of Ethiopia, the exchange of cultivars and information suits the means of smallholders, who may negotiate in barter, cash, seeds, or economic or social obligations, such as plowing and barn repairs. At weekly markets and annual farm fairs, growers discuss methods and share potato tubers and cereal grass, corn, and peanut seed. Regional interaction sustains agricultural commerce while nurturing varietal diffusion of germplasm, the life source of each food species.



A botanist examines samples at the Millennium Seed Bank, a conservation project run by Britain's Royal Botanic Gardens, Kew. The purpose is to protect against dwindling plant diversity by preserving the seeds of wild species from around the world. *(Glyn Kirk/AFP/Getty Images)*

Unlike small-scale seed trade, wealthier, better-educated planters in Kenya profit from hybrid seed, extension services, and credit as well as up-to-date information on botanical advances in corn and grain. In contrast, Ethiopians benefit from folk networking that retains regional open-pollinated plants. One-to-one negotiation fosters goodwill and sharing during ecological disasters. A similar grassroots cooperative in Huancavelica, Peru, circulates the hundreds of native potato cultivars that form the food heritage of the Andes. In Taounate, Morocco, a parallel exchange of fava beans fosters plant strains that flourish in the North African climate and drought conditions. Such traditional swapping preserves ancestral and exotic food plants for home and community use and spurs crop evolution within a limited ecosystem.

After decades of plant engineering and the patenting of seeds in industrialized nations, growers worldwide still choose the folk seed trade over exclusive hybrid plants. The Seed Savers Exchange, a nonprofit gene bank that preserves heirloom and open-pollinated food plants, furthers diversity and the rescue of some 100,000 threatened plant species. The program began in 1975 at Heritage Farm north of Decorah, Iowa. The company states in its pledge an intent to protect consumers from genetically engineered plants out of a belief that genetic engineering threatens cultural, economic, and political welfare. On an 890-acre (360-hectare) farm, owners organize fruit tree grafts and seed swaps with the descendents of emigrants from Asia, Europe, and the Middle East. Their success with German Pink tomatoes, Koronis Purple beans, Lao eggplants, Russian pickling cucumbers, Silver Bell squash, and Turkey Crow beans furthers a camaraderie among farmers and gardeners who treasure the food plants of America's past. In addition to vegetables, Seed Savers maintains 360 grape varieties and hundreds of apple types plus tubers of horse radish, Jerusalem artichokes, potatoes, and sweet potatoes.

Other domestic and international organizations work one to one on locating obscure and endangered food sources, such as Christmas basil, Fuyu persimmons, Goji papaya, heirloom cowpeas, loquat, pawpaws, Seminole pumpkins, Surinam cherry, and wild currants. In addition to food plants, traders share herbs, such as clary sage, feverfew, gentian, and hyssop.

Adventurous gardeners obtain food sources to introduce traditional plants or new cultivars in distant locales or to shorten the growing time for bitter orange, bunching onions, cherry tomatoes, echinacea hybrids, and ghost peppers. Others

seek more productive stock made possible by hard-neck garlic, medlars, rare pulses, and perennial chives, scallions, and strawberries. Internet consortia—at sites such as davesgard en.com, www. gardenweb.com, heirloomseedswap.com, seedswaps.com, wintersown. org—facilitate the dissemination of both seeds and cuttings along with suggestions from experienced growers. The Internet also has become a major marketplace for commercial seed companies around the world.

In 2008, the American Seed Trade Association (ASTA) launched a crusade to collect quality seed to protect humankind in the event of disaster. In cooperation with state and regional rescuers, ASTA investigates new technology and alerts members and the public to governmental policies affecting the distribution and development of seeds, a \$12 billion business.

See also: Agribusiness; Agriculture; Heritage Foods; Hybridization; Jefferson, Thomas; Lapérouse, Jean François Galaup; Livingston, A.W.; Paula Marín, Francisco de.

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Shellfish

A culinary highlight of coastal cuisines, fresh water and saltwater invertebrates comprise a flavorful, textured foodstuff for imaginative cookery. As early as 18,000 B.C.E., foraging for crustaceans preceded formal strategies for fishing and hunting. From age five, the children of hunter-gatherers assumed responsibility

for gathering ground-level cacti, eggs, grubs, and nuts. They waded in river estuaries or tidal pools and shallows to collect edible seaweed along with cockles, cowries, crabs, crayfish, limpets, mussels, scallops, soft-shell clams, and periwinkles (sea snails).

Adults assumed the more difficult task of reef fishing with spears, diving for sea urchins, or scooping into nets and plaited baskets conches, cuttlefish, lobsters, oysters, prawns, and squid, all sources of iodine, vitamins A and B12, and high-quality protein. The early Chinese and Japanese fished or “jigged” for cuttlefish and squid at night by lantern light and dried the meat for market. Analysis of shell middens has confirmed the centrality of aquatic invertebrates as raw material for fishhooks and shell money in Oceania and as necklaces added to the grave goods of Channel Islanders.

The meat and roe provided dependable meal sources, whether stone-boiled, dried, salted, or baked in an earth oven with seaweed and ti leaves, Polynesian style. Hawaiians valued conch and crab as a curative or stimulant and the whorled exoskeletons for fashioning into trumpets. At Tanna in the New Hebrides, whelks served a similar purpose as a signal horn. In British Columbia, Indian women strung scallops on a cord to dry like apples and smoke over lodge fires.

History

Although highly perishable, seafood figured in the gastronomy of nations close enough to a shore to supply their tables with tender morsels. Religious cookbooks from Mesopotamia dating to 8000 B.C.E. exemplified local enthusiasm for refined cookery of shellfish and turtles. Because of the meticulous separation of hard-shelled invertebrates from their carapace, cooks extended small amounts of meat as ingredients in patties and stew. Healers also ground unshelled varieties into a curative plaster or salve to soothe sores.

Evidence from Abydos, Britannia, Gaul, Mycenae, and Turkey attests to the popularity of oysters, which traveled well pickled and brined in clay jars. Egyptians valued the *otaria* (ear shell), found off the estuary of Alexandria, for its delicate sweetness. Recipes from classical Greece mentioned skewered shrimp

brushed with honey for roasting over embers and cuttlefish cooked with squid and sprinkled with shredded herbs. Early writings enumerated the best locations for tasty crustaceans, notably, Chalcedonian oysters, the cockles of Messina, and the periwinkles of Mitylene.

Romans not only relished crustaceans but also valued their shells ground into tooth powder and their meat as aphrodisiacs. In the first century C.E., commentary by encyclopedist Pliny the Elder identified lobster as a favorite dish, especially of legionaries stationed in Britannia. He summarized methods of whelk baiting and envied the shell fishermen of India, who harvested from the Indian Sea oysters 12 inches (30 centimeters) in diameter. His nephew, essayist Pliny the Younger, preferred the giant shrimp of Laurentum near Rome. Other sources depicted sea anemones as costly table exotica.

Later in the first century, the Roman cookbook author Apicius recommended Smyrna shrimp for grinding with celery leaves and *garum* (fermented fish sauce). Cooks shaped the mix into balls or patties. Apicius also advised on broiling and shelling lobsters and seasoning the minced meat with cumin and rue. To supply the kitchens of the Emperor Trajan late in the century, oystermen packed their quarry in snow to keep them fresh and tightly closed.

In ancient times, crabs never attained the same popularity as lobster, oysters, and snails, which both the Romans and Chinese valued as barter items, or of the razor-shell cockle, limpet, and periwinkle, sweet favorites of Athenaeus, a Greek gourmand living in Egypt in the third century C.E. As a treatment for delicate stomachs, Athenaeus recommended seasoning meat with cinnamon and pepper. To expand trade, entrepreneurs devised ways of tricking nature. Crustacean farming involved the lining of sea bottoms with pot shards. After oysters attached to the fragments, cultivators repositioned the oysters to prepared ponds.

In Byzantium, aristocrats dyed their robes with purple ink from the murex, a member of the whelk family, and chose as a table treat Black Sea zebra mussels flavored with *garum*. Across the Western Hemisphere reusable earth ovens layered with leaves or seaweed contributed a smoky savor to slow-roasted crustaceans. The many choices added abundance to the Portuguese diet, which, like the cuisine of Iceland and Japan, featured more seafood than that of other nations. According to legend, the prince of Japan so prized the razor-shell cockle that he forbade fishermen to harvest them. In later centuries, New Year's

celebrants claimed the Japanese *awabi* (mussel) as a symbol of the famine diet of their ancestors.

Far-flung shore peoples developed culturing ponds to enhance the shellfish industry. Mesoamericans readied tidal passages for seed by lining them with tree branches. Faeroe and Shetland Islanders farmed the scaly horse mussel as food and bait. In 1235, an Irish sailor shipwrecked in Aiguillon, France, accidentally discovered that stringing a net over the sea bottom to snare diving shore birds also attracted mussel spawn to the artificial habitat. In Normandy, growers built rafts to stabilize a variety of young crustaceans imported from Portugal.

Religious Taboos

Although Europeans relished baked *pinnae* (sea wings), cockle porridge, and cold crab and lobster sprinkled with pepper and vinegar, Muslims and Jews clung to scriptural admonitions. In the Renaissance, obedient Jews avoided crustaceans, which Leviticus 11:9–12 forbade as a form of *treif* (inedible food). Educated readers of the Torah recognized the danger from shellfish, which harbored typhoid pathogens. Muslims came to diverse opinions: Shi'ites rejected shellfish, which Sunnis considered edible. In dire situations, authorities bypassed rigid cultural taboos and allowed consumption of available seafood.

Catholic countries suffered no doubts about crustaceans. With abundant clams, lobsters, mussels, and squid from the Adriatic and Tyrrhenian shores, Italians turned shellfish into table highlights. On arrival at the French court of Henry II as a bride in 1533, Queen Catherine de' Médici contributed to her new realm the foundations of the Florentine banquet. At Chambord, her skilled chef presented herbed oysters and shellfish *insalata* (salad), a satisfying dish lacking the heavy layers of fat in the medieval ox. Moist shellfish, particularly the oyster, acquired a reputation for heightening sexual pleasure. In art, the exoskeletons of crustaceans attained symbolic worth as coded messages of desire.

Shellfishing for Sustenance and Profit

Saltwater invertebrates proved lucrative to New World settlers. In 1620, the

Pilgrims of Plymouth, Massachusetts, learned from returnees at Popham colony at Sagadahoc, Maine, how to ward off starvation during dire winters. In imitation of coastal Algonquins, the English equipped fishing stations to provide enough clams and oysters to sustain a colony until spring. Thrifty colonists recycled shells as clam rakes and shovels. Dried quahogs provided trade goods for negotiations with inland tribes.

On December 13, 1621, the Wampanoag chief Massasoit led 60 to 100 tribe members to the first American Thanksgiving with gifts of five deer, turkeys, geese, ducks, eels, and shellfish. The following year, Governor William Bradford considered lobster an appropriate choice of meat to serve friends. In 1629, he purchased Tiverton, Rhode Island, for its abundant clam, mussel, and oyster beds. Within three years, the commercial possibilities of shellfish led to the “Oyster Wars” of 1632, fought over beds cultivated in the Chesapeake Bay by fishermen from Maryland and Virginia. In Connecticut and Rhode Island, oyster dredging and shucking in the 1680s foretold a shore industry.

During the federal period, Atlantic Coast oyster houses popularized raw and fried bivalves as quick dinners for travelers and workers. The poor made do on meals of beer, bread, and oysters, much as indigent Irish reapers combed rocks for edible limpets. Hard workers earned up to \$4.50 a week for filling barrels with clams. By the late 1770s, however, steady harvesting had destroyed the clam and oyster beds at Cape Cod, Massachusetts, which fishermen restocked with shellfish from Chesapeake.

Industrialization of the fishing industry brought structure to commercial shellfishing. As of October 26, 1825, the completion of the Erie Canal from the Hudson River at Albany, New York, to Lake Erie allowed the transport of fresh oysters to Ohio and canned or pickled oysters to Missouri. Thus, oyster suppers became standard celebrations in Cincinnati and St. Louis. With the spread of tuberculosis, the demand for oysters increased as iodine-rich curatives, whether fried, scalloped, or ground into sausage. Simultaneously, clam digging boosted income for Provincetown and Wellfleet, Massachusetts, and Cape May, New Jersey. In the 1840s, lobster became a staple commercial item for Connecticut and Maine fishermen, who endangered their sources by overfishing.

Commercial Cuisine

Beginning in the 1870s, commercial chilling introduced to coastal communities large-scale preservation of shellfish, a deviation from canned crab and lobster and the high-sodium content of salted fish and roe. In the late 1800s, showy table displays included ice sculptures surrounded by fish and shellfish, particularly for cruise line buffets, hotel brunches, and wedding receptions. One popular oyster recipe, *Anges à Cheval* (Angels on Horse back), involved wrapping oysters in bacon for grilling. By the 1880s, the appetite for oysters began threatening the stability of coastal beds in Europe and the United States.

As the restaurant business drew more Americans and Europeans toward flavorful menu items, ocean life continued to decline in number and quality. In 1885, the Christian Woman's Exchange of New Orleans issued *The Creole Cookery Book*, a generous list of soups and fish and shellfish dishes. Louisiana Cajun appetizers favored oyster cocktails flavored with Tabasco. Farther north in the 1890s, restaurant chefs made a table-top event of cooking Shrimp Wiggle in chafing dishes by stirring shrimp pieces into green peas and cream sauce. The post-World War II popularity of Alaskan king crab encouraged exploitation by Japanese and Russian fisheries.

Evidence of shellfish endangerment in the 1980s demanded immediate action from fishermen before species reached extinction. At a consortium of U.S. environmental experts in New Orleans in April 1995, observers evaluated habitats and identified sources of pollution and health hazards from algal blooms. Four months later, a conference in Pensacola, Florida, increased the monitoring of watersheds. From the efforts to sustain aquaculture came the Shellfish Challenge Plan to halt the failure of beds in the Gulf of Mexico.

Aquaculture and fishing has become the fastest-growing global food industry. Australia thrived on intertidal cultivation of rock oysters and the subtidal farming of mussels, oysters, and scallops, which grew on ropes or in baskets and matured rapidly from calcium-rich feedings. A similar investment in the trochus, a sea snail common to Fiji and New Zealand, focused on a hardier crustacean usually safe from attacks by crabs.

In 2002, crustaceans occupied an alarming place in the socioeconomic divide. A U.S. restaurant survey found shellfish gaining in popularity as fast-food snacks and signature menu items. About 10 percent of new specialty entrées featured

shellfish. Meanwhile, among the Gitga'at Nation at Harley Bay, British Columbia, children reared on food stamps and government handouts lost contact with the age-old Pacific diet by deserting healthful shellfish for junk food.

The Future

Currently, shellfish is one of the five most common causes of food intolerance and a prime source of “red tide” toxins from algal blooms, such as the one that closed Indian Neck, Massachusetts, to fishing in June 2005. Four idiosyncratic syndromes attack the immune system with amnesia, diarrhea, nerve damage, and paralysis. Allergic response can begin with tingling and hives and heighten to fainting and fatal shock. Infectious hepatitis, which can originate in shellfish polluted by sewage, causes jaundice, a yellowing of eyes and skin that may last for months. A source of norovirus contamination comes from the hands of seafood harvesters and sorters who unknowingly infect clams, mussels, oysters, and other filtering bivalves. Food inspectors look for adulterated decks, chopping blocks, and collection hampers as points of recontamination from raw crustaceans, which gastronomes eat at raw bars with little more flavoring than cocktail sauce and lemon juice.

Nonetheless, shellfish remains in the forefront of distinctive dishes, from Rhode Island steamed quahogs and clam chowder to Hawaiian limpets, Maryland crab cakes, Japanese sea urchin milt vinaigrette, and Malaysian nerites. Under the market name *rock lobster*, fresh water crayfish appears on menus from the Carolinas to Brazil. The demand remains so great in the Bahamas, Florida, and Louisiana that dealers import stock from Australia, Chile, New Zealand, and South Africa.

Meanwhile, industrial aquaculture from Cape Cod, Massachusetts, to the New Jersey shore has gained in intensity in recent decades. It requires either the capture of wild stock for growing in cages and tanks or domestication in marine locales, beginning with the seeding of clam, geoduck, mussel, and oyster beds. Hawaiian shellfish farms specialize in prawns. Pacific Coast suppliers in British Columbia and Washington State sell mollusks, especially live sea urchins, to the Japanese, whose domestic supplies are limited. On September 16, 2011, CBN

News sponsored Operation Blessing International, a gift of 40 boats to Japanese fishermen who lost their source of income from the March 11 earthquake and tsunami. Meanwhile, researchers attempted to turn waste feathers into a filtration system to reduce toxins in Japanese shellfish.

See also: Cajun Diet and Cuisine; Chowder; Cookbooks; Disease, Food-Borne; Hunter-Gatherers; Inspection and Safety, Food; Pit Cookery; Virginia Company of Plymouth; Wild Food.

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Sicilian Diet and Cuisine

Sicilian fare derives from the availability of fresh ingredients from land and sea—fish, olive oil, grains, fruit, rice, and vegetables. Since prehistory, Sicilians have grilled and roasted with bay leaf and oregano the region's prolific mussels, anchovies, sea urchins, swordfish, cockles, amberjack, crabs, prawns, cuttlefish, and whitebait. Short-lived wild olive trees produced fruit from 10,000 B.C.E. Around 6000 B.C.E., farmers cultivated fava beans for drying, eating raw, or adding to stews and soups, which they garnished with wild fennel.

Since 1000 B.C.E., islanders have adapted to cyclical invasions. After Corinthians founded Siracusa in 734 B.C.E., they raised goats and sheep and planted grapes,

figs, hazelnuts, pomegranates, walnuts, and wheat. In the 600s B.C.E. in Messina, Greek settlers grafted wild olive trees with the verdello, a domesticated variety and source of large fruit, olive pâté, and oil for dressing greens sautéed in garlic. Residents of Magna Graecia (Sicily and southern Italy) also pickled capers, pressed and reduced syrupy grape must, and cured ham and bacon from island piggeries. The Greeks treated island wine with resin to produce retsina. Like mainland cooks, Sicilians began grilling fish, game, and lamb kebabs over charcoal *foculari*, slow-cooking braziers invented in Egypt.

Sicilian agriculture flourished from the creation of Greek and Roman *latifundia* (plantations). Traders exported thyme honey, a prime sweetener of Greek and Italian drinks and sponge cake, and shipped abundant soft wheat and flour east. In the fifth century B.C.E., Sicily joined Enotria Tellus (land of wine), a vineyard network that fermented wines popular in Carthage, Iberia, Italy, Provence, and Corsica. The early vintages prefaced island success at producing marsala, faro, moscato, and fragrant malvasia, made from fresh and dried grapes.

Literature preserved enthusiasm for diners on Sicilian food. Around 350 B.C.E., the Sicilian poet Arcestratus rhapsodized over grilled bonito. In the 200s B.C.E., the poet Theocritus of Siracusa praised country beans, wine, and wild celery as the source of Sicilian cuisine. The island colonies provided Greek pantries with the best cheese, including savory balls of *caciocavallo*, a stretched curd cheese. Cooks grated goat and sheep's milk cheeses over baked dishes to brown into an au gratin (cheese crust).

Control under Augustus, the first Roman emperor after 27 B.C.E., resulted in an agrarian revival and profits from which the empire skimmed 10 percent. Sicilian goods filled military kitchens at outposts in Greece and Macedonia. To meet the demand in Rome for cereals, overseers ordered widespread seeding of land with lentils, pulses, and hard triticum durum wheat, the foundation of pasta. Roman traders imported citrons, cherries, and plums from the Middle East and introduced allspice, nutmeg, ginger, cardamom, and cinnamon to island cookery. One long-lived recipe for egg drop soup illustrated a homey comfort food—broth dotted with balls of bread crumbs, cheese, and eggs.

Medieval Innovations

Christianity impacted the thinking of Sicilian cooks during the early Middle Ages, a period of innovation and prosperity marked by wedding and first communion feasts. Preparers made Easter cakes from *scaldato* (cottage cheese) and invented a dish combining sardines with fennel, raisins, and pine nuts. On March 19, bakers shaped and fried dough into *sfinigi*, altar gifts to San Giuseppe (Saint Joseph), who shielded them from famine. Each December 13, a similar votive recipe for sweetened wheat gruel honored the blinded martyr Santa Lucia (Saint Lucy). In observance of fast days, cooks sliced boiled shrimp, octopus, and calamari into a seafood salad sprinkled with a lemon-based dressing and served clams over spaghetti.

In the 700s, pasta factories in Palermo produced the macaroni and noodles that Arabs added to chicken soup and cinnamon and raisin desserts. After 827, North African Arabs overran western Sicily at Palermo and planted banana, date palm, pistachio, and lemon groves, which they watered with irrigation canals. Palestinians imported currant bushes, a source of tiny raisins. Saracen cooks introduced sesame, saffron, cinnamon, coffee, couscous, handmade pasta in olive oil, and a mutton entrée seasoned with almonds and mint. Eastern recipes combined apricots with meat and rice, Persian style. Arab bergamot, jasmine, and sugar sweetened zabaglione (egg custard) and cannoli (tubes of sugary cheese) and flavored ice from Mount Etna for melon sorbet, the forerunner of gelato and granita.

Islanders adopted a fusion cuisine based on ethnic insurgent foodways. In 920, Arabs planted the first crocus beds, a source of saffron. From Arab gastronomy, Sicilians skewered kebabs, stuffed fish and poultry, baked one-pot rice entrées, and served caponata (Tunisian eggplant with capers), a favorite appetizer. Portuguese crusaders planted sweet blood oranges, shaddocks, limes, and tangerines, the source of candied rind, preserves, and salads sprinkled with anise and wine. Lombards brought seed for white arborio rice. Arab control after 947 revived the tradition of the kitchen garden, which the Greeks had introduced at Siracusa. At Palermo, home gardeners raised onions, pomegranates, and artichokes, an edible Berber thistle.

The Norman Conquest of 1060 made a few changes in Sicilian cuisine, notably rotisserie cooking and air-drying cod. From 1096 to 1204, crusaders settling in Sicily imported their taste for Arab specialties made with almonds, cinnamon,

cumin, and pepper. Christian and Muslim immigrants lived peacefully together and generated a fusion cuisine flavored with melons, lemons, and oranges as well as figs, pine and pistachio nuts, pomegranates in syrup, and tahini paste made from roasted and ground sesame seeds.

After the accession of William II in 1166, Norman lords stripped peasant farmland of its wealth and generated a two-level caste system. Traders satisfied Norman demands for Middle Eastern foodstuffs, which they imported from Alexandria and Jerusalem for the pantries of the rich. By the 1300s, taxation on the peasantry suppressed ethnic cuisine and reduced the poor to subsistence foods, such as the winged pea and butter instead of cheeses.

Island Prosperity

At the high point of the Renaissance, voyagers introduced Sicilian ports to rice, the basis of sweet desserts mixed with egg custard and fruit. In the 1400s, Sicilian cheese proved profitable for dairy farms, as did sugar for Jewish investors. Abbeys and nunneries produced painted marzipan replicating the blush of island fruit.

Industrial ovens turned out white bread for the wealthy and black loaves for peasants. When food shortages ended the dominance of professional bakeries, the poor extended homemade bread with bean husks, berries, grass, leaves, nuts, parsnips, sawdust, seeds, squash, and wild radish and asparagus. After the expulsion of Jews in 1493 and the influx of Aragonese grandees, the ruling class continued to expand excessive banquet entrées with sunflower oil, chocolate, lima beans, corn, turkey, potatoes, cactus, chilies, and tomatoes from the New World.

The victory of Giuseppe Garibaldi over Spanish Bourbon overlords in July 1860 left Sicilians free to determine the future of their traditional cuisine. Many returned to the fresh produce of their heritage, such as basil, peppers, and zucchini, and revived the traditional family meal prepared by the female head of household. Fishermen prospered once more on profits from sardines and octopus. House wives pureed tomatoes and dried them in the sun into a utilitarian paste. Pastry chefs baked amaretti, almond ovals served with coffee.

In the twenty-first century, Sicily relies heavily on agritourism, an economy based on the pleasing of travelers with homegrown produce. Tables spread with snails, chickpeas, pasta, pine nuts, rice and meatballs, porcini mushrooms, beans, prosciutto, and bluefin tuna attest to a lusty appetite among islanders. To entice guests to a feast, Sicilians display attractive tidbits—anchovies, cured ham, pecorino cheese, *bottarga* (dried mullet and tuna roe), radicchio, figs, Gaeta olives, and preserved lemons and lemon liqueur.

See also: Athenaeus; Fish and Fishing; Mediterranean Diet and Cuisine; Pasta; Rice; Trading Vessels.

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[Sierra Leone Company](#)

A colonial enterprise on the Grain Coast of West Africa, the Sierra Leone Company, established in 1792, added a permanent colony to Great Britain's holdings and an important new source of produce for Europe.

The creation of a settlement for London's black poor began in May 1787 as a reward for loyalists who fought for the redcoats during the American Revolution. The group, organized by the Committee for the Relief of the Black Poor, consisted of black Nova Scotians and immigrants from Bengal and the West Indies. Most were farmers, fishermen, and artisans. An expedition of 411 men, women, and children, arranged by English abolitionist and reformer Granville Sharp and escorted by administrators and ministers of the St. George's Bay Company, founded Granville Town, a utopian effort at Fourah Bay known as "the Province

of Freedom.” Commerce introduced the New World freedmen to the Bambara, Fula, Hausa, Mandinka, Soso, Wolof, Yoruba, and other native African traders. The community survived until an assault by the Temne, rival traders, in December 1789. Destroyed by arson, the town was a total loss.

In 1790, Sharp issued a second call to former slaves to colonize free African territory. His backers intended the newcomers to establish a link in Britain’s global food trade to supplant the slave trade. He anticipated 500 applications but received over 1,100. Incorporated by parliament, the settlers met opposition from slave traders in Bristol, Lancaster, Liverpool, and London.

In January 1792, sea captain John Clarkson guided 1,196 black Nova Scotians aboard 15 ships and sailed from Halifax to Sierra Leone. They founded Freetown on March 11, 1792, and received allotments of land—20 each for men, ten for women, and five for children. The location suited commerce because of the natural harbor, which the British chose as a naval base for its antislave trade patrol.

Liberated blacks raised rice, a luxuriant crop sown in June and reaped the next October. A less demanding commodity, cassava grew over a four-month period but could remain in the fields for gradual harvesting of roots. Freetown gardens also produced bananas, cashew nuts, castor oil, cocoa, cola, corn, eddoes, millet, okra, palm wine, peanuts, plantain, potatoes, sweet potatoes, and yams for subsistence and sale. Fruits, herbs, and tender vegetables grew abundantly—apples, breadfruit, cardamom, cream fruit, figs, guava, limes and oranges, melons, pawpaws, pigeon peas, pineapples, plums, pumpkins, squash, tallow tree fruit, and tamarinds, all easily sold at the vegetable market. Their meals featured abundant greens—callaloo, purslane, and sorrel—and two local spices, *barreliera* and *mabeck*. The ambitious produce growers sought immediate profits from arrowroot, cam-wood, coffee, cotton, ginger, gum, hemp, honey and wax, palm oil, pepper, and rice. They also saw promise in cinnamon, mahant for nets and rope, sesame, sugarcane, and a short-stemmed variety of nutmeg (*Piper guinense*).

In the colony’s beginning, land clearing drained the “born-again Africans” of energies for commercial agriculture and orchardry. Their main objective lay in feeding and protecting their families. The absence of farm-to-market roads from the dense interior inhibited the sale of such perishable goods as cherries, grapes,

and tomatoes. To speed foods to customers, women ventured into Freetown and hawked fresh produce along the streets and harbor. Until competitive tribes ended Freetown's barter with the African heartland, dealers used rum or tobacco rather than currency as a medium of exchange.

During British hostilities with France, the Sierra Leone Company encountered business setbacks from naval incursions and piracy. In late September 1794, Freetown suffered the same demise that had ended Granville Town. After soldiers from five French warships pillaged and burned the community and uprooted gardens, colonists fled to sanctuary with Pa Demba, the headman of a small village. Survivors relied on trade with American merchants for supplies to rebuild. They returned to raising cattle and poultry and fruit and vegetables for export and to supplying the 200 natives who came daily from 80 miles (130 kilometers) away to buy their food products.

In a gesture to the United States, from 1794 to 1799, Scots abolitionist Zachary Macaulay, the governor of the colony, offered American ex-slaves parcels of free land. Bearing testimonials of good character, the newcomers agreed to seek British citizenship and to devote two years to clearing at least one-third of their land. In 1807, the Sierra Leone Company became the African Institution, a haven for former slaves. As of January 1, 1808, Sierra Leone flourished as a Crown Colony. In the 1820s, Freetown grew into a West African commercial nexus, a magnet for trade caravans.

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[Silk Road](#)

A romanticized web of land and sea routes from Europe and the Persian Gulf to China and Malaysia, the Silk Road / Silk Route) introduced Western society to the delights of the East. Stretching from the Mediterranean over the Levant and Afghanistan around the Taklimakan Desert and along the Great Wall of China, the track reached the venerable city of Xi'an in east-central China. The cultural nexus occasioned the world's first great venture into globalized cuisine. For nearly two millennia, armies, missionaries, nomads, pilgrims, and tradesmen traversed 4,000 miles (6,400 kilometers) by camel, donkey, horse, and yak, each bearing up to 700 pounds (320 kilograms) of goods. Western dealers trafficked in Eastern dyes, fabrics, food therapies and medicines, fragrances and ointments, lapis lazuli, spices, and Tibetan jade. Along the way from Izmir on the Aegean Sea to the Chinese terminus, goods changed hands rapidly, rising in value with each leg of the journey. In lieu of a common currency, strangers bargained through hand gestures with bolts of silk.

Adventures in meals and beverages encompassed a span of foodstuffs and kitchen crafts. A parallel sea route from Vietnam connected the Far East with Ceylon, India, and Egypt. Along the way, knowledge of history and geography, of religion—Buddhism and Zoroastrianism— and of technology—block printing, carpet weaving, glass blowing, making gunpowder, mirror and paper making, sericulture, silversmithing, wine making, wood carving, and wool weaving—from ancient China, India, and Persia influenced the civilizations of the Middle East and the Mediterranean. The result was the forerunner of fusion cuisine, the merger of tastes and cooking methods from disparate cultures. One popular example, the concept of breaking down gluten in dough, encouraged the stretching of noodles into thin strands for soup, *lumpia* (fried strips), and stuffed dumplings, which entered menus as far west as Sicily and Spain. Another unique taste,

[Recipe: Lemon Pickles](#)

Boil 25 whole lemons in 5 cups of water for three minutes and drain.

Quarter the fruit and season with 4 teaspoons of salt and 1 teaspoon of asafetida powder. Grind into a paste 30 black peppercorns and 15 cloves with 3 tablespoons each of salt, sugar, and vinegar. Add to this paste 1 tablespoon of white cumin and 2 teaspoons each of black cardamom and red chili powder. Rub the paste into the quartered lemons. Pack into a jar. Moisten with the juice of ten lemons and set in the sun to hasten pickling.

asafetida root from southern Bactria impressed Greek buyers with its utility as a treatment for respiratory ills and indigestion and as a condiment, meat marinade and rub, and pickling spice.

Merger of Tastes

In the second century B.C.E., the Asian frontier separated two distinct cultures, the settled agrarianism of the Fertile Crescent and the seminomadic pastoralism of the Steppes. In 138 B.C.E., ambassador Zhang Qian (Chang Ch'ien), an explorer and representative of the Chinese Emperor Wudi (Wu Di), extended the markets of vendors from the Han dynasty. To enhance business with Afghanistan, India, Parthia, Turkestan, and Uzbekistan, Chang recorded data for the imperial court on trade items, particularly bamboo canes and cloth, and on exotic foodstuffs—caraway, coriander, eggplant, figs, sugar beets, and wines—available from central and western Asia. A major flavoring breakthrough, garlic added pungent smells and boosts to the immune system as well as flavoring for marinade, meat and fish rubs, pickles, and sauces. Chang also enlightened millers on the Persian technique of expressing oil from sesame seed and of grinding soft, easily blended flour from wheat. Upon his return in 125 B.C.E., China established commercial relations with Persia, which dispatched up to ten Eastern expeditions per year.

Along the Silk Road, Chang's mission preceded a flood of food swapping. From India, the Chinese acquired basil, black pepper, cardamom, curry, oranges and pomelos, and spinach. From the Persians, China began importing cucumber and marigold seed, fenugreek, grapes, pomegranate and quince bushes, sour cherry and sour plum stock, sumac, walnut and pear trees, and horses. Persian alfalfa seed aided Chinese horse breeders with a nitrogen-fixing forage and a pollinator

for bees and provided pharmacists with an herbal digestive tea that treated arthritis, edema, and kidney disease. Under the Han Emperor Ling in 156 C.E., the Chinese domesticated sesame for pasta, seed cakes, and oil for saucing. Among court aristocrats, sesame became the era's fad food.

Fed by the lucrative silk trade, the east-west conduit traversed deserts, mountains, and bandit enclaves to enlighten isolated peoples to the innovations of great cities and empires. Caravans to China delivered Armenian apricots, Ethiopian coffee, Samarkand honey, Somalian aloe, and Persian dates, pistachio nuts, and saffron. From the Chinese, the Indians adopted anise, cassia, cinnamon, leeks, licorice, onions, pepper, red and yellow rice, rhubarb, and sesame oil as well as bananas and citrus fruit. Indian pharmacists learned to cook beetles in hot brine and to prescribe curative meals of baked or pickled silkworm pupae, caterpillars, green bottlefly larvae, and water bugs, all available at Beijing restaurants. Silkworm cocoons required soaking in water before scrambling them with chicken eggs or saucing them with onions. At Chinese commercial centers in Hangzhou (Hangchow) and Kaifeng, snack vendors steamed savory ping cakes, a holiday fruitcake. Visitors strolled along specialized markets for grain, pork, and vegetables. Butcher shops sold cuts to order. Specialty stalls displayed beans, oranges, and preserved fish, essentials to China's extensive catering businesses. In northern China, Peking chefs began incorporating imported millet in dairy and meat dishes and wheat into dumplings and noodles; to the south and in Szechuan, cooks balanced fruit and vegetables with fish and pork for peppery rice-based entrées. In imitation of Chinese cuisine, Indian and Persian cooks turned rice into a basis for their hybrid cookery.

Rome and the Rise of the Silk Route

After 100 C.E., the Roman Empire tapped Silk Road commodities in Alexandria, Egypt, and generated the first international cuisine. For expedience, the Emperor Trajan established the first Chinese embassy and posted legionaries along the east-west highway. Roman staples—beans and lentils, bread, oil, olive, and wine—accommodated additions of beer, butter, meat, and milk and flavorings with cabbage, celery, dill, kale, and parsley. Soldiers marching to distant postings

carried in their knapsacks the elements of Rome's newfound cookery. By expanding varieties of peaches from Greece and tart orange and yellow apples from Kazakhstan throughout the provinces, Roman arborists introduced methods of espaliering, grafting, and pruning. Resultant strains of cooking and snacking apples and fragrant varieties for saucing and beverages expanded Roman demand for pome fruit. Italian traders satisfied the chef's need for cinnamon, galangal, and turmeric. Stocks of cardamom, ginger, and white pepper rose dramatically in cost because of a 25 percent import tax, but Romans willingly paid the tariff to acquire spices that they deemed powerful antidotes to food poisoning. The empire achieved its own renown as the source of Falernian and Opimian cult wines, which they produced at a rate of 1,600 gallons per acre.

Over the next 500 years, east-west trade reached its golden era. Arab traders educated farmers in Iberia, Italy, and North Africa on rice culture, a landmark of the global food market. Additional cross-fertilization of food staples through oasis towns introduced African melegueta pepper, okra, and watermelons and Middle Eastern barley, chickpeas, figs, dates, grapes, olives, pine nuts, and wheat to the Far East. From Kashmir came saffron; India contributed cardamom. Indonesia produced the most succulent oranges. By increasing stocks of domesticated pack animals, Islamic traders enlarged dissemination of pantry and produce staples to include aubergine, cucumber, spinach, and sugarcane, the source of a pan-European dessert craze. Chinese cooks experimented with stewing, flavoring meat with cinnamon, fermented black beans and soybeans, galangal, ginger, and mustard. The development of wok stir-frying added heady aromas and savors from coconut milk, dates, lotus seed, and mango and a final topping of Turkish alcohol.

The popularity of tea drinking dates to the eighth century and Lu Yu's treatise *Ch'a Ching* (*The Classic of Tea*, ca. 760 C.E.), a guide to purchasing filters, rollers, and sieves for drying, storing, and steeping tea leaves. Green tea fascinated Arab and Bactrian merchants, who reached Xi'an and immediately sought relaxation in tea houses. By way of cultural exchange, Western merchants impressed the Chinese with glazed Islamic tableware colored inside and out. Alongside opulent cups and platters, they set glass carafes and goblets and serving dishes embossed with copper, gold, and silver. They contributed to China's tables the Turkish grilled meat, halvah confections, kebabs, noodle soup, wheat cereal, and yogurt.

Jewish merchants returned home with Chinese carp, a specialty fish revered by the Ashkenazim of southern Europe. Arriving from China to Afghanistan, carrots influenced the color, flavoring, and texture of Arab and Persian cookery.

Dynamic Dishes

Invigorated interest in cuisine increased food commentary and menu critiques. Travelers noted variations on Eastern recipes, particularly flatbread, mare's milk butte and cheese, soups, and *mantou*, a fried or steamed bun or dumpling. In 1027, the Emperor Zhao Zhen (Renzong) saved the poor from hunger by importing lentils from India and a fast-ripening Vietnamese rice. Chinese publishers distributed recipes in food compendia and food remedies in compiler Su Song's 21-volume *Ben Cao Tu Jing* (*The Illustrated Basic Herbal*, 1061), a compendium of 780 drugs and 634 herbs. During the Song dynasty, banqueting attested to the wealth and cultivation of aristocrats, who vied for the most opulent table settings. Meanwhile, the rise of the nomadic Mongols introduced wild game cookery to the West. By boiling bear, boar, tiger, and wolf haunches with berries, fruits, greens, and tubers, they produced uniquely flavored stews. Mongo sophistication increased with the import of the *tannur*, a clay oven from India, and of lamb-based recipes employing generous use of chickpeas, ghee (clarified butter), and parsley. At the fragmentation of the Mongols after 1271, the Chinese rejected lamb as a political protest to northern insurgents.

Late in the Middle Ages, Eurasian cross-fertilization increased along the transcontinental food chain, China's main channel of communication with the West. Cookbooks described 43 kitchen techniques for 42 meats, 50 grains, and 68 fish varieties. In 1279, Kublai Khan rejuvenated overland trade from its lapse following the fall of the Tang dynasty. Marco Polo's expedition to China, which ended in 1295, revealed the unique use of charcoal for cookery. He observed service of delicate wines and rice in fine porcelain bowls, the extrusion of macaroni, and the salt-making industry. His dictated writings described the world's first fast food, curdled mare's milk fermented into koumiss, a dairy innovation first processed by the Scythians.

By the fifteenth century, the speed and safety of sea routes replaced slower,

more treacherous overland travel and the haphazard packing of food on dray animals. So dazzled were European navigators by the promise of a rich global food trade that they began plotting new water routes to the Spice Islands, a yen that directed Christopher Columbus toward the New World. In 1526, the founding of India's Mughal Empire promoted the fusion of central Asian cookery with pilaus spiced with cinnamon and nutmeg, cloves, nut and yogurt toppings and with sweets scented with rose petals. By 1550, China joined the rest of the world in adopting Dutch snow peas, Portuguese watercress, and American specialties—beans, chili peppers, guava, squash, tomatoes, and turkey. Propagation of sweet and white potatoes relieved famine conditions with crops that required less hand labor than rice and which flourished on marginal farmland. Corn and peanuts bolstered nutrition with foods that could be baked, boiled, or milled. Even Mexican cactus fruit, chayote, and jicama appeared in Far East recipes.

See also: Ibn Battuta; Polo, Marco; Trade Routes; Trading Vessels.

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Slave Diet

See African Slave Diet

Sloane, Hans (1660-1753)

An Irish physician and archivist, Hans Sloane summarized the strengths of the West Indian diet and introduced milk drinkers to chocolate milk.

Born in Killyleagh, County Down, Sloane collected curiosities from nature, a lifelong hobby. In London and Paris, he studied botany and pharmacy. After completing a medical degree at the University of Orange in Vaucluse, France, he practiced medicine in Jamaica, where he advocated smallpox vaccinations and the treatment of malaria with quinine. He championed pure water and the regular hydration of the body with water rather than wine or ale.

Upon opening a practice in 1689 in Bloomsbury, Sloane became one of London's most respected doctors. As head physician at Christ's Hospital, president of the Royal College of Physicians, and governor of the Foundling Hospital, he used his prominence to campaign for pure drugs and food and to promote a two-year regimen of breastfeeding to combat high infant mortality. His written report on mother's milk was one of the earliest to cite hospital statistics to prove his theory.

Sloane foresaw the commercial exploitation of drugs and foodstuffs from the West Indies. In the ethnobotany, *Natural History of Jamaica* (1707–1725), he characterized arum, corn, plantain, sorghum, and yams as nourishing foods relegated to livestock and slaves. He mounted samples of valuable food commodities, including the kidney bean and peanut, examples of the influence of West African slaves on the North American diet. In addition to cataloging 800 Caribbean plants, he published *A Voyage to the Islands Madera, Barbadoes, Nieves, St. Christophers, and Jamaica* (1707). The text described the milling of cacao nuts with Indian pepper and the separation of froth from the oil. He recommended chocolate as a digestible "simple" promoting nourishment and well-being.

Sloane disliked the native drink of cocoa mixed with pepper and water because of its bitterness. He chose milk as a base, added chocolate liquor and sugar, and introduced England to his sweetened drink. Doctors prescribed chocolate for consumptives and as a treatment for dysentery, inflammation, and kidney stones. Sloane warned that overindulgence could worsen frail health.

Aficionados bought chocolate milk ready mixed from druggists Nicholas

Sanders and William White and in powder form from a Birmingham chocolate and cocoa factory, where Quaker brothers John and Richard Cadbury packaged cocoa in tins. The chocolate recipe appeared in cookbooks and influenced service in chocolate houses.

In addition to his fame for inventing milk chocolate, Sloane gained a professional reputation as president of the Royal Society, a founder of the British Museum, and the physician to Queen Anne, George I, and George II and to the British army. The British Museum houses his tinglazed ceramic chocolate cups from Italy.

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Slow Food

A contemporary eco-culinary movement that protects aboriginal food culture, heritage, and tradition, Slow Food advocates celebrate the quality and flavor of food and wine worldwide. Founded in Langhe, Italy, in 1986 by gastronomic activist Carlo Petrini of Barolo, the Slow Food initiative began with a protest of a McDonald's opening along Rome's Spanish Steps. From a single public brouhaha grew his media and Internet war against cosmetically enhanced, shippable foodstuffs and unnatural, out-of-season meals.

Petrini's outreach to world cuisine embraced Indian tandoori, Korean noodles, and innovations in falafel, lady apples, ostrich, souvlaki, and tacos. Recalling the husbandry of rural foodstuffs after World War II, he mocked Carrefour and Tesco supermarkets as wasteful and warned of the spiritual sterility of a distracted eat-and-run lifestyle. On behalf of smallholders and farmer's markets, he proclaimed Monsanto's patenting of seeds a form of biopiracy against Third World

developers of heritage fruits and vegetables. His campaign gained the support of chefs Mario Batali and Graham Kerr, *Saveur* magazine, and winemaker Robert Mondavi.

Rather than a luxury for the rich and privileged, Petrini envisioned food service as a daily act of joy, a celebration of gusto. He scorned big name television cookery as “pornographic” and urged career chefs to offer sensory training to children and to feed patients in hospitals and retirement homes out of a reverence for satisfying meals. In place of strutting before audiences, he harangued food experts to plant school gardens and to rescue Argentine amaranth, Canadian Red Fife wheat, Chiapas coffee, Cornish salted pilchards, Dutch lobster, Greek and Polish cheeses, Malaysian rice, and Moroccan argan oil—all acts of sharing, collegiality, and “virtuous globalization.”

In a revolt against banality and capitalistic factory foods, the movement fought the genocide of taste. Members promoted not only freshness and savor but also the environment and animal and human rights. The project “Ark of Taste” took as a model Noah’s Ark and the shielding of rare cultivars. Slow Foodists professed a philosophy of leisurely conviviality and vowed to maintain table conversation and pleasure to humanize the younger generation.

The concept spread to France, Germany, and Switzerland by 1993. Writers and journalists praised the movement with rhapsodic essays; travel companies began organizing Slow Food tours. In 1996, Slow Food crusaders issued the periodical *Slow*, which focused on global health as well as fair pay for producers and accessible prices for consumers. In Africa, members pledged to create 1,000 community vegetable gardens from Morocco to Madagascar. Growers began sharing their experiences and coordinating green methods of controlling pests and boosting harvests.

Eco-gastronomists joined producers to protect sustainable, quality food crafts as regional assets. Members supported wild food collection and local “foodsheds,” the venues of agrarian and oceanic biodiversity. In 2001, European members launched a “No GM Wine” appeal to halt the marketing of genetically modified (GM) grapes. They also defended raw milk cheeses as living museums of dairy history. With tastings and potlucks, consortia recognized terroirs, the geographical locales of the best in dairy, farm, orchard, smokehouse, and vineyard produce. On the movement’s twentieth birthday, donors sent funds to

the Louisiana food communities devastated by Hurricane Katrina in August 2006. The U.K. Slow Food chapter focused on salvaging cheddar and perry, traditional British products. The following year, reformers in Munchberg, Germany, saluted “Slow Bier.”



Italian author and gastronome Carlo Petrini (*left*) founded the international Slow Food movement in the 1980s. American restaurateur, chef, and activist Alice Waters (*right*) pioneered the organic food movement. (*Paul Sakuma/Associated Press*)

Slow Food events in 153 countries bring together locavores involved in maintaining food standards. In April 2011, Grandmother’s Day throughout Ireland honored inherited skills, such as baking sponge cake for tea and cooking boysenberries, loganberries, raspberries, and tayberries into jam. A month later, food promoters recruited Canadian youth for the Perth County Terra Madre assembly to demonstrate camp cookery, gardening, and pig roasting. A May gathering in De Haere, Holland, offered a symposium on slow eating. In Genoa, Italian fishermen and consumers attended a conference on sustainable species and marketing.

In June 2011, the Sami of Jokkmokk, Sweden, organized a delegation to study traditional knowledge and language of indigenous people. A similar training session at Darlington, New South Wales, presented Australian cuisine,

spotlighting Aunty Beryl Van Oploo's kangaroo curry and pies. On Fyn Island, Danes hosted Germans and Swedes at a gastronomic fair displaying artisanal baked goods, cheese, fruit juices, and seafoods. A July initiative in Springfield, Illinois, hosted "Kid's Day at the Farm." In October, Viennese Slow Food fans held a diversity market, a concept repeated that same month in Wolfville, Canada, and Tours, France. Basque chefs presented culinary programs in December in Bilbao, Spain, in opposition to homogenized, industrialized food.

See also: Agriculture; Nomad Diet and Cuisine; Pit Cookery; Theophrastus; Wine.

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Smoked Food

After the control of fire for cooking in 498,000 B.C.E., the smoke from burning dung, plants, and wood increased the savor and lengthened the shelf life of a variety of edibles—almonds, beans, cheese, garlic, peppers, prunes, pumpkin seeds, radishes, and whiskey. The most common smoked goods involve meat—chipped beef, cod, frankfurters, geese, kielbasa, mackerel, pastrami, roe, salami, and turkey breast. Hot smoking cooks tissues while preserving them. Cold smoking fumigates and increases temperatures, but it does not heat foods enough to alter delicate textures, such as the sirloin cuts used in Italian chevon (goat) sausage and brewed ales, lagers, porters, and stouts tinged by smoke in Australia, Austria, Brazil, Canada, Denmark, England, Finland, Holland, Italy, Japan, New Zealand, Sweden, and the United States.

As a partial preservative, smoke vapor permeates exterior tissues with hydrocarbons, such as the woody gases that preserve Barbary ducks from Nantes, the tea smoking that flavors game hens in China, and the brief smoking of Pandora moth caterpillars by Paiute Indians. Curing over a fire reduces the risk of trichinosis from bacon infested with trichinae (roundworms). The smoke also kills bacteria and fungus on the surface of fish and meat but not on the interior.

Smoking increases long-term storage time, as in the case of sweet *lap cheong* pork sausage lightly cured in southwestern China and dry Australian sausage stuffed with kangaroo meat, a high-protein, low-fat trail food. In Corsica, five days of smoking dries the pork liver in *figatelli* sausage until it is safe for eating for up to 30 days. For Czechs, Danes, Dutch, Germans, Poles, and Swedes, the smoking process turns oily eel meat into a gourmet item for canapés served on brown or black bread. The Sami of Finland smoke reindeer for daily consumption, setting aside smoked tongue as a delicacy.

In prehistory, smoking may have evolved as a means of thwarting flying insects during the drying of fish and game. From 100 B.C.E., German brewers dried malt over an open flame to make *Rauchbier* (smoked beer), a specialty in Bamberg. The unique kiln process imparted a sweet, musky accent. Roman dairiers smoked cheese to impart a woody taste. In northern Italy in 1000, the curing of pork butt into *andouille* sausage set a standard of flavor and texture for smoked meat. Louisiana settlers transported the preservation method from Europe and contributed smoked meats to both Cajun and Creole recipes.

The Industry

For traditional home smoking, after the invention of the flue chimney in the twelfth century, Manx, Northumberland, and Scots families hung deer sides and kippered herring inside the chimney in free-flowing smoke. Herring required two full days of vapor treatment. At Grimsby, a fishing center on England's east coast from the 1100s, the availability of cod and herring fillets fresh from the Faroe Islands, Iceland, and Norway turned into a business the preservation of seafood over smoldering sawdust fires. After the arrival of the railroad in 1848, Grimsby's smoked fish flourished along with the rest of the sea-fishing industry.



Preserving meats, fish, and berries since humans first gained control of fire, smoking provides a universal means of enhancing flavor. Here, filleted salmon hangs in a smoke house in British Columbia, Canada, for cold or hot smoking. (Sarah Leen/ *National Geographic/Getty Images*)

The British fish market preceded by four decades a similar growth of the smoked, salted haddock business begun in Arbroath, Scotland. Arbroath smokies, a popular processed fish, required beheading, cleaning, brining, and suspending on wooden dowels over a smoking barrel. East of London, Jews from Poland and Russia introduced the curing of Baltic and Scottish salmon, a popular fatty fish on deli and restaurant menus. The spread of Romanian Jews to Montreal around 1890 imported the salting and curing of spiced beef brisket for pastrami, a mainstay of Canada's kosher delis for service on bagels.

A cold smoke bath flavored Danish and German cheese, meats, oysters, salmon, and scallops, which then required further cooking. The curing of applewood cheese, cheddar, Gouda, Gruyère, mozzarella, and *scamorza* by the cold process could take up to 30 days. Hot smoking combined the processes of flavoring and cooking over a smoldering fire, thus shrinking tissues by evaporating moisture. To prevent complete desiccation—such as the roasting of pheasant and venison—cooks placed a pan of plain or herbed water over the flame to maintain tenderness. The most thorough smoking resulted from barbecuing or pit roasting, which raised the meat temperature to a safe level for

consumption. Industrial smoking ensured the edibility of salmon by adding a purifying gas to wood vapors.

Techniques

Different types of fuel impart uniqueness to cured edibles, such as the burning of rice bran to cure and harden bean curd for smoked tofu. Forest Indians of North America chose fruitwoods and maple for preserving trout and whitefish. Alaskan and Pacific Coast tribes in British Columbia and Washington State preferred hickory or oak chips for smoking wild salmon for jerky or for drying fillets and nuggets for glazing with honey. Southern pit farmers saved corncobs and savory sassafras roots for smoking bacon, ham, and ribs before flavoring the meat with cinnamon, honey, maple, molasses, or red pepper. Curing reduced hams to 75 percent of their kill weight and fish to 33 percent of their catch weight. The poor valued soul food seasoned with smoked bacon and ham hocks, which stretched their meat budgets by up to 200 percent.

For Mexican and Tex-Mex grilled fish and steaks, roasted chicken and pork, and sea salt, slow-burning mesquite added flavor. A specialty, chipotle (smoked jalapeño peppers) fueled a fad for canned adobo marinade as well as ground and whole peppers for use in condiments and salsa. After 1915, immigrant brewers from Austria, Czechoslovakia, and Germany at Shiner, in south-central Texas, applied the same vapor principle to the smoking of Spoetzl beer, giving it a caramelized quality.

Combustibles, according to experts, also influence the outcome of curing. Currently, Scandinavians flavor beer with juniper vapor. Eurasians burn alder and oak, such as the alder wood that permeates salt from the Black Sea, oak sawdust for smoking York ham, and oak smoke flavoring for Spanish paprika, which cures for 14 days. In Luxembourg, brined ham smokes for a week over a blend of beech and oak chips. Peat gives a complex aftertaste to Imperial Russian Stout and Scotch ale and whiskey. In Germany, Black Forest ham absorbs savor from smoldering fir, as opposed to Westphalian ham cured over a blend of beechwood and ground juniper.

New Zealanders smoke beer and fish by burning tea tree, which yields

antibacterial sap. Japanese processors pickle daikon radishes after curing them over cherry-wood. In China and Taiwan, smoked plums bolster wine fermented from oolong tea and plum liquors. Lapsang souchong tea from Fujian, China, internalizes a smoky flavor from the burning of cedar or pine tar as a desiccant, which complements the natural strength of black tea.

Home grillers and commercial preparers of smoked foods may enhance flavor by atomizing liquid smoke, a condensation of the gases of wood combustion, or adding a few drops to marinades. Health food specialists condemn liquid smoke and smoke-flavored oils, especially from beech and poplar, for raising the risk of colorectal and stomach cancer in otherwise safe comestibles, such as jalapeño peppers and lamb. In 2010, the European Food Safety Authority studied 11 smoke flavorings to determine levels of toxicity but reached no conclusion as to danger from eating artificially smoked cheese, fish, and meat.

See also: Arctic Diet and Cuisine; Horses; Salt; Sausage; Scandinavian Diet and Cuisine; Travel Food.

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Snack Food

A between-meal phenomenon, snack food is a product of hunger pangs and availability. Portable snacks, such as fruit, seeds, insects, and nuts, existed in

prehistory as pack food for travel and hunting. Yogurt, which the Sumerians coagulated in 6000 B.C.E., produced a handy power drink. After 1200 B.C.E., almonds, chestnuts, hazelnuts, pistachios, and walnuts satisfied the empty stomachs of Phoenician seamen.

Asian cooks mastered the production of convenience eats. From 400 C.E., at Xiamen (Amoy) in Fujian Province, China, a regional pancake enfolded bean sprouts, cooked filling, seaweed, and hot mustard or plum sauce. In 156 C.E., the Chinese domesticated sesame for seeded dough strips. At commercial centers in Hangzhou and Kaifeng, street hawkers steamed fruit and dough into savory *ping* cakes. In the same era, along the Silk Road, tea with dim sum (dumplings) relaxed traders in Guangdong. The bite-size morsels of pork and seafood fit neatly in the hand. Wrappings of bamboo or lotus leaves prevented mess.

For all-day theatrical performances, Greeks took breaks with pies and wine coolers purchased from street stalls. Families in Crete, Greece, Italy, the Levant, and Magna Graecia (Sicily and southern Italy) roasted *erebinthos* (chickpeas), a high-protein grain with satisfying mouthfeel. Roman laborers who lived in kitchenless apartments relied on snack shops for apples, nuts, olives, and tarts filled with eels, goat meat, shellfish, and songbirds. Aristocrats, who disapproved of eating in public, consumed their snacks at the public baths.

Worldwide, cooks based finger food recipes on local ingredients. Berbers in the Sahara toasted locusts for snacks, while Palestinians preferred chickpea paste and *halwa* (hard jelly). In 6 C.E., Tamil laborers took a break with *idli*, a spongy dal. Australian Aborigines preferred raw or grilled witchetty, a large white grub. For medieval laborers leaving home at early hours without time for breakfast, leftover cold cuts and oatcakes sufficed until the late afternoon meal.

New World

In the Western Hemisphere, Native Americans ate cherries and plums and relied on jerky and sliced pemmican for a packable snack reduced in weight from lengthy evaporation of moisture. After 950 B.C.E., the Inca ground nuts into peanut paste, a forerunner of peanut butter, a power spread still popular with the Dutch, British, Filipinos, and Indonesians. The Quechua of Argentina, Bolivia,

Chile, Colombia, Ecuador, and Peru turned raw or coal-roasted caterpillars and larvae into light repasts. When Spanish conquistadors invaded Mexico in 1519 C.E., they discovered the penchant of Emperor Montezuma II and his advisers for munching on peanuts. Spaniards became the first Europeans to encounter two more American treats, popcorn and foamy *xocolatl* (chocolate), a caffeinated beverage spiked with chili pepper.

American settlers brought from Europe the knowhow to make English fruit puddings and apple turnovers, Scots scones, and German pretzels, a tasty hot or cold treat they shared with Indians. In 1728, William Byrd, the founder of Richmond, Virginia, obtained an energy boost from dried bouillon. Colonial mothers satisfied discontented children with maple syrup drizzled on snow and with fruit leather, a berry or pome fruit puree spread thin for drying. In the South, the growth of sporting events and festivals connected citrus drinks and fried pork rinds with fun.

In the 1800s, frontier women relaxed with teatime, a late afternoon opportunity to visit and share tidbits prepared in cabins and sod huts from berries and nuts, such as cranberry preserves and sugared hickory nuts. Children anticipated an evening of sipping cider and popping corn in a wire basket over a log fire. In Charleston, South Carolina, in 1832, John Mathews marketed the first carbonated sodas, the impetus to sarsaparilla, a nonalcoholic beverage available from coast to coast. After 1853, the “Saratoga chip” ousted other potato snacks as the potato chip, a fabricated nibble processed from dried potato flakes or flour.

Starving Confederate troops ravaged fields for “goobers,” a common slave food named for the Angolan word *nguba*. Soldiers returning from the American Civil War turned peanuts into a street snack on a par with the Roman chickpea, Russian sunflower seed, and Renaissance roasted chestnut. As the costs of sugar and chocolate fell, factories churned out sweet lozenges shaped in molds.

The American melting pot welcomed new snacks, such as the Scandinavian gingersnap. Just as Italian Americans relished their pepperoni rolls and Sicilian Americans revered pizza slices, Jewish immigrants and factory laborers embraced the dill pickle for its convenience and zip and the knish for its thick potato filling and availability from ghetto pushcarts. Likewise, the Pennsylvania Dutch satisfied between-meal cravings with pickled beans, eggs, gherkins, and root vegetables.

Commercial Fare

The late nineteenth and the early twentieth century saw a change in eating habits and times. Americans could choose from a host of tempting snacks, beginning with Cracker Jack in 1893, Hershey bars in 1900, Popsicle ice pops in 1905, Oreos and Life Savers in 1912, Kool-Aid in 1920, Flier bubble gum in 1928, and Toll House cookies and Hostess Twinkies in 1930. Families gobbled handfuls of popcorn, an inexpensive stomach filler during the Great Depression and a substitute for confections during the rationing of sugar in World War II. Movie theaters enhanced the smell of popping corn with butter-flavored salt to entice patrons to munch during the film. The saltier the batch, the more likely the audience would buy sodas.

At cafés, late-afternoon hors d'oeuvre menus featured nachos, a crunchy snack of tortilla triangles topped with savory cheese and jalapeño peppers. In 1932, Southwestern innovators of Tex-Mex recipes created the Frito pie, made from corn chips invented by Elmer Doolin of Frito-Lay in Atlanta, Georgia, and Memphis, Tennessee. Emulating the flavor of tostados (fried tortillas), the Frito chip combined easily with beef chili and beans, jalapeños, onions, and shredded cheese for a variant of nachos. A second boost to salted snacks, the end of Prohibition in 1933 revived saloon and lounge traffic. Barkeeps enticed drinkers by offering salted gherkins, pickled eggs, and crackers. For street festivals and fairs, Hawaiian cuisine contributed shaved ice, an icy ball topped with flavorings of coffee, lime, peach, pineapple, and satsuma, a seedless tangerine.

U.S. airlifts to the Burma Road in April 1942 ferried C rations, tins packed with the homey flavors and textures of chocolate squares, biscuits, instant coffee, and sugar cubes. After World War II, veterans returned home with a yen for chocolate, an emerging giant of comfort foods. At the end of World War II rationing, Americans and Europeans celebrated by reaching for taffy, nougat bars, and gumdrops at soda shops, theater lobbies, and candy stores. Factory extruders, invented to shape nuggets of feed for livestock, pushed out corn curls, the first squeezed-out snack.

In the 1950s, televised jingles and cartoons touted sweets with smiling actors enjoying Juju Babies, Mary Janes, M&Ms, PEZ, and Tootsie Pops, all unsuited to a balanced diet and dental health. British snack tables offered hearty spiced finger

foods—shrimp *satay*, spicy cheddar bites, curried corn fritters and deviled eggs, and lamb wontons. The 1970s brought Carnation Instant Breakfast and power bars, a packable cereal snack.

New Alternatives

Health food advocates took a new look at popcorn in the 1980s and reclaimed it as a fiber food, a low-calorie filler reducing hunger and satisfying the urge to chew. Modern versions of poppers ejected a kernel exploded with air rather than hot oil. In 2003, Illinois Governor Rod Blagojevich declared popcorn the state snack, a gesture of support for the prairie corn culture. After 2006, the calorie-conscious demanded reduced trans fats. Frito-Lay led the rush to retool and reformulate grain and potato snack production, all previously processed with oil at high heat. Nutritionists examined the marketing of junk food to schoolchildren at ages when they established eating habits.

Holiday and party food writing devoted newspaper columns and whole cookbooks to dips and munchies for tailgate eating, Super Bowl snacks, study night breaks, and New Year's Eve trays. Cookbooks even included pet snacks, such as liver and soy cookies and peanut butter snaps. The shift to weight consciousness in the 2000s resulted in additions to the packaged snack canon—carrot and sweet potato chips, granola bars, yogurt drinks, jalapeño poppers, frozen grapes, and hummus. Proponents of healthful snacks recommend small meals of fruit and raw vegetables to promote satiety and a sustainable body mass.

See also: Corn and Maize; Crackers; Fast Food; Jerky; Kebabs; Lunch; McDonald's; Soft Drinks and Juices; Street Food; Tortillas; Voegtlin, Walter L.

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[Soft Drinks and Juices](#)

The production of refreshing beverages parallels ingenious methods of pressing and liquefying sweet fruit pulp. In the Western Hemisphere, the extraction of juice from fruit by hunter-gatherers predates agriculture as a source of satisfaction for sweet pulpy liquids, such as that of agave, cranberries, barrel cactus, crab apples, and prickly pear as well as saguaro juice, a ceremonial drink to bring rain. Significant to the appeal of fruit nectars, their perishability conferred an image of delicacy and pleasure and an appreciation of juice as a tonic for toddlers and the sick. Natural yeasts that initiated fermentation extended the view of fruit juice as magical.

From 5000 B.C.E., Middle Eastern date palms provided pulp for fruit syrup and date wine, an intoxicant denounced by abstemious Hebrew priests. Persians and Syrians upped the light taste of fruit drinks with the raw juice of sweet oranges, which blended with pomegranate juice into a crimson thirst quencher. Orange growing migrated by traders to Iberia and Provence, where the French dubbed the refresher *jus d'or* (golden juice).

In the seventh century C.E., the banishment of alcoholic drinks from Muslim households elevated fruit juice as a refresher and mealtime drink suitable for adults and children. When Islam arrived in Indonesia, it promoted the consumption of passion fruit juice, a restorative drink also common in Australia, Ecuador, Costa Rica, India, and Kenya. In the eleventh century, Viking hosts offered crowberry, bilberry, and cowberry juice as welcoming refreshers to guests. A similar rise in juice consumption occurred in the late sixteenth century, when Spanish dealers planted citrus groves in colonial St. Augustine, Florida, and introduced oranges to the Dutch.

North Americans made tribal tonics and teas from a prodigious variety of

extracts of rose hips, canyon grapes, pokeberries, milkweed, cream berries, Solomon's seal, gooseberries, wolfberries, Ponderosa pine, dewberries, tickseed, and sumac. In the far north, gatherers favored Alaskan rhubarb, mooseberries, and mountain sorrel, which preparers added to seal blubber. Blackfoot husbands and favorite sons received special attention from ceremonial chokecherry juice. Apache women pounded honey mesquite beans into a pulpy nectar consumed like milk; Mendocino children dried silverpuff juice into gum. The Cherokee treated guests to passionflower drinks. The Navajo prized saskatoon juice as a marinade and juniper juice as a famine food.

Industrialized Beverages

From the conception of carbonated drinks in 1767, manufacturers have varied the original two-ingredient formula—carbon dioxide and water—with birch bark, fruit pulp and juice, herbs, spices and wine. In 1820, Townsend Speakman, a Philadelphia pharmacist, distributed Dr. Physick's Soda Water, a fizzy health tonic. Distributors stored cork-topped bottles on their sides to prevent the drying of cork and release of gas. The invention of the church key opener in 1892 simplified cap removal with a portable gadget.

Nineteenth-century diners favored berry and fruit ades, fruit juices combined with sugar and water. Lower in calories than marmalade, cool pitchers of fruit ade accompanied teatime scones as well as children's lunches and family picnics. Urban snackers patronized the soda fountain and popularized ginger ale, fermented ginger beer, and phosphate soda, an extension of carbonated fruit drinks with phosphoric acid. First aid manuals recommended ginger ale for queasy stomachs and inflamed throats. Bartenders found greater use for ginger ale for mixing with alcohol for cocktails and punch.

A drugstore specialty, the phosphate came in egg, malt, and fruit flavors and remained popular until the 1930s, when pure juices in cans rose in consumption. Eroding the popularity of carbonated drinks between 1890 and 1910, the invention of inexpensive pasteurized grape and orange juice (*Citrus sinensis*), a sweet antiscorbutic, gave consumers a wider choice between fizzy and nonbubbly beverages for breakfast. Home refrigerators kept juice cold for impulse drinking.

Teetotal church congregations welcomed Charles Welch's pressed grape juice as an alternative to wine. In Australia in 1926, the sale of fresh-squeezed Sunkist lemon and orange juice at 4¢ per drink introduced the Pacific world to carbonated citrus beverages. South Africans promoted honey beer and the nectars of wild fruit, which vendors purchased from as far inland as Lesotho and Swaziland for blending with millet porridge. In the last decade of the phosphate fad, cardboard six-pack cartons enabled buyers to carry six bottles with ease. In the same period, vending machines served chilled bottles in bus and train depots and food stores and at beach and tourist sites.

Vegetarians in the mid-1900s popularized smoothies, an iced fruit or vegetable juice cocktail available at juice bars. Pre-World War II consumption of fruit juice reached 45 million cases, with grapefruit the front-runner over pineapple. In 1942, the U.S. Army Subsistence Research and Development Laboratory identified fruit juice as a necessary health boost to motorized desert units. By the late 1990s, worldwide commerce in juice reached 13.2 billion gallons (50 billion liters), with orange outranking apple, grape, and pineapple in sales.

Designer Waters

The mid-to late 1900s generated patronage of sports drinks, a source of rehydration and restoration of electrolytes lost from exertion and sweating. Unlike V-8 and cranberry tonics, sports beverages offered controlled formulas designed by physiologists. Athletes combated fatigue during training and competition by sipping isotonic drinks balanced in salt and sugar to reflect body chemistry. Cups of sports beverages reputedly protected runners and team players from heat stroke. In 1965, Stokely-Van Camp began distributing Gatorade, a 50-calorie fluid replacement formulated at the University of Florida to fortify the stressed athlete with sugars, potassium, and sodium.

In the late 1990s, fruit water and vitamin water promoted a feeling of health through the blending of vitamins B, C, and E with mineral water or tea and fructose. Litigation against Vitaminwater by England's Advertising Standards Authority declared nutritional fruit-flavored soft drink manufacturers misleading in their claims to promote endurance and recovery from exertion. In 1998, the

Center for Science in the Public Interest published *Liquid Candy: How Soft Drinks Are Harming Americans' Health*, a warning that makers of designer drinks—Hoist, OXYwater, KonaRed, and Thirst for Greatness, known as T4G—conceal the dangers of artificial coloring and sweeteners to health, especially that of children. The alert stressed the parallel rise in soft drink consumption with incidence of obesity, diabetes, kidney stones, degenerated bone mass, low potassium, eroded tooth enamel, and dental caries.

See also: Carbonation and Carbonated Beverages; Cider; Fast Food; Guar; Packaging; Snack Food; Vinegar; Wild Food.

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Soul Food

A reminder of slavery, African and Southern culture, and a history of making do, soul food showcases the intimate kitchens and heritage cuisine of African Americans.

Triangular slave trade from the late sixteenth to the early nineteenth century introduced to the New World the black abductees who worked plantations as well as mills and mines. To the New World diet, African newcomers brought okra and peanuts, the bases of Creole, Caribbean, and Southern specialties, notably, gumbo, peanut brittle, and pralines. Cabin staples—chestnuts, clabber (buttermilk), hot sauce, molasses, rice, sorghum—combined with cabbage, collards and pot likker, corn, manioc, poke, turnips, and yams to produce survival

meals for blacks newly introduced to freedom. Family and church celebrations allied shared spreads with fellowship, horse shoes, hymn singing, and juba dancing.

During the protracted Jim Crow era, meats for black sharecroppers and poor whites tended toward the rejected cuts and scraps—"chitlins and cracklins'," guinea hen, ham hocks, oxtails, pig's feet and skin, and tripe— along with river bottom feeders, carp and catfish. Hunters and trappers added groundhog, opossum, rabbit, raccoon, squirrel, and wild turkey to rural meals. Coastal Gullah tradition contributed gastronomy based on lowland crab, oysters, shrimp, and turtles. From the Mississippi River delta came recipes for black bean soup and hoppin' John, a savory combination of black-eyed peas, ham bone, onion, peppers, and rice. Home food preservation involved the young in coring pears for pear preserves, drying slices for fried apples pies, and scalding tomatoes for canned soup mix.

Southeastern native tribes—Cherokee, Chickasaw, Choctaw, Creek, and Seminole—added alligator, terrapin, and smoked venison to serve with field peas, green beans, lard cakes, and wilted lettuce. Pone, grits, and hominy (corn soaked in lime) influenced indigenous inventions—cornmeal dumplings, hoecake, liver mush and souse, and succotash. A simple child pleaser, hush puppies (corn fritters) paired with coleslaw at fish fries and with fried fatback in knapsacks and pockets as travel food. Jack Daniel's Tennessee Whiskey, a sour mash drink introduced in 1866, rounded out good eating and fellowship.

From legacy recipes such as sweet potato pie and watermelon pickles, Malinda Russell issued *A Domestic Cookbook: Containing a Careful Selection of Useful Recipes for the Kitchen* (1866). A 49-year-old mulatto cook, Abby Fisher, an illiterate former slave in South Carolina and Alabama, compiled a revered soul food cookbook, *What Mrs. Fisher Knows About Old Southern Cooking* (1881). Rufus Estes, an emancipated slave and Pullman redcap, collected another version, *Good Things to Eat* (1911). Blacks who rode the rails to the Freedom Belt in the North opened soul food stands and cafés in Chicago, Detroit, New York, and Philadelphia. During the Harlem Renaissance, food and music lured whites to "speakeasies," where bootleggers plied customers with fish sandwiches, fried green tomatoes, pinto beans, corn bread, and moonshine.

Southern black cooking styles traveled to the Freedom Belt and thrived in

Chicago, Detroit, New York, and Philadelphia. Popularized in the 1960s, soul food equated with ethnic comfort food, such as blackberry cobbler, pork brains and eggs, chicken feet, fried country ham and redevye gravy, hog jowls, muscadine wine, and ribs. The flavor and aroma of bay leaf, garlic, onion, sesame, and thyme enhanced beet and dandelion greens, Jerusalem artichokes, purslane, shad roe, she-crab soup, and shrimp grits, the subjects of *The Taste of Country Cooking* (1976) by Edna Lewis, a Virginia-born chef at Café Nicholson, a Manhattan eatery. The unpretentious recipes stimulated the five senses and satisfied the appetite much as slave-era meals soothed the anguish of bondage and repression.

[Recipe: Mrs. Fisher's Jumberlie \(Jambalaya\)](#)

“Take one chicken and cut it up, separating every joint, and adding to it one pint of cleanly-washed rice. Take about half a dozen large tomatoes, scalding them well and taking the skins off with a knife. Cut them in small pieces and put them with the chicken in a pot or large porcelain saucepan. Then cut in small pieces two large pieces of sweet ham and add to the rest, seasoning high with pepper and salt. It will cook in twenty-five minutes. Do not put any water on it.”

In the 1980s, the media placed greater emphasis on the high incidence of diabetes, heart attack, and stroke among poor folk, notably residents of Mississippi and Louisiana who consumed a diet high in inexpensive commodities—banana pudding, wild-gathered creasy greens (cress), lard, pork neck bones, rhubarb pie, sugary home-canned peaches, and sweet tea. Around 1995, Lewis ignored attempts to replace Southern ingredients with tofu and yogurt and formed the Society for the Revival and Preservation of Southern Food. Her example of historical sustenance survives in the documentary *Fried Chicken and Sweet Potato Pie* (2006) and in the field trips and oral history projects of the Southern Foodways Alliance, affiliated with the Center for the Study of Southern Culture at the University of Mississippi.

See also: African Slave Diet; Cajun Diet and Cuisine; Cookbooks; Mustard; Pork;

Restaurants; Whiskey.

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Soup Kitchens

Soup kitchens, like homelessness and underemployment, have existed throughout world history to provide on-site meals for the needy. Around 2200 B.C.E., Ptahhotep, an Egyptian vizier under King Isesi, recognized the danger of discontent of those with empty bellies, who threatened the social order. On festival days around 1100 B.C.E., Egypt's royal pantry managers opened their stores to the public for a general distribution of meat and bread and all the beer that petitioners could drink. In the Torah, Exodus 16:3 records how Hebrew slaves took part in Egypt's public dole. Ethiopians, according to the Greek traveler and historian Herodotus, established a similar reputation for charity at Carthage. As he described, around 551 B.C.E., the Persian king Cambyses I sent spies to report on "the table of the sun," a meadow outside the city where volunteers boiled meat each night for service throughout the following day. According to Ethiopian ethics, the earth yielded meat for sharing with all.

Food Charities Through the Ages

In the Middle Ages, handouts became a staple during the rise of religious missions and monasteries. A Christian saint in central Germany, Elizabeth of Hungary, became the patron of bakers and the homeless after distributing grain to the impoverished in the 1220s. She also caught fresh fish and made rosemary tea for the hungry. In Florence, Italy, in 1244, Pier Bossi led the Misericordia charitable order in relieving bouts of starvation among the poor and providing transportation to medical centers and burial for the dead. Dispatched from the Piazza del Duomo, they appear in a painting by Domenico Ghirlandaio in 1472 alongside stacks of bread and vats of wine, where three agents filled the empty pitchers of destitute peasants.

Other faiths pursued the feeding of the poor as a humanitarian obligation. In 1545, the Fatih mosque of Istanbul hosted 3,000 paupers twice a day and served meals of bread, chickpeas, mutton soup, plums, and yogurt. The location housed a laundry and clinic serving hygiene and medical needs. In the mid-1500s, Angad Dev, second of the ten orthodox Sikh gurus, set up a communal *langar* (soup kitchen) in Khadur Sahib, India, to feed all who sought food, what ever their caste, race, or religion. At the end of each meal, he organized outdoor sports to encourage physical stamina among street beggars.

When horticulturist Edward Richard Gardiner wrote *Profitable Instructions for the Manuring, Sowing and Planting of Kitchin Gardens* (1603), he subtitled his book “Very profitable for the common wealth and greatly for the helpe and comfort of poore people.” Gardiner struck to the core of malnutrition by abandoning table dainties for hearty soups made from beans, cabbage, and carrots. His dictum implied that salad greens and herbs were luxuries belonging only on the tables of the well fed, a belief in keeping with status-based Renaissance nutritional standards. The unfortunate needed more satisfying root crops, which cooks made palatable by simmering them in broth.

Nineteenth-Century Initiatives

The concept of an ongoing network of civic altruists and moral reformers thrived in New York City after 1802, when the Humane Society opened its first soup kitchen. To prevent abuse of the system, volunteers distributed tickets to paupers.

Breadlines of the down-and-out concerned conservatives, who blamed the soup kitchen for drawing criminals to the area. In the 1820s, a backlash in Chicago against social reform aimed at forcing derelicts and tramps to seek work and support themselves rather than rely on churches and food pantries to provide a daily meal.

The Irish Potato Famine (1845–1852) turned world attention to the social dangers of poverty, which escalated to epidemic, rootlessness, and rebellion. In the introduction to his *Treatise on Food for People* (1850), Bavarian theologian Ludwig Andreas Feuerbach challenged evangelists to inveigh against hunger rather than preach on sin. Charles Elmé Francatelli, Queen Victoria's personal cook, added an entry to his compendium, *A Plain Cookery Book for the Working Classes* (1852), encouraging more people to make soup for the poor, especially during the winter, when scanty food supplies prevented common laborers from doing their jobs. After the spread of the Salvation Army to Australia, England, France, Ireland, Scotland, and the United States in 1880, the Protestant charity took as its symbol the soup kettle.

In the United States, altruism flourished in large cities during the rise of the home economics movement. American essayist Rebecca Blaine Harding Davis championed late-nineteenth-century asylums, charity schools, missions, and slum kitchens, feeding stations that also provided medical care. The emergence of messianic zeal in the late 1800s restructured domestic school curricula to meet the needs of mendicants and low-income immigrants. Popular lecturer Sarah Tyson Rorer, an educator at the Boston Cooking School, urged Christians to feed the poor and upgrade humble homes with cookery classes and recipes for inexpensive soups. Instructor Maria Parloa predicted that such hygienic instruction would reduce the number of felons and orphans. The Cooking Teachers' League elevated food distribution to a "religion of right living."

During the Panic of 1873, Commodore James Gordon Bennett, owner of the *New York Herald*, set up eight soup kitchens in the city. The chain dispersed 2,000 meals a day, prepared by Charles Ranhofer, head chef at Delmonico's restaurant. A critique in *Frank Leslie's Illustrated Newspaper* acclaimed the gourmet-quality soup from immaculately clean kettles. Staff served the public in neat rooms similar to the scientific laboratory at chemist Ellen Richards's New England Kitchen, a facility that sustained malnourished refugees of European wars and

trained them in American-style meal planning and cookery.

At the height of interest in public kitchens, German army Captain M.P. Wolff, author of *Food for the Million: A Plan for Starting Public Kitchens* (1884), studied the penny kitchens that fed the poor in Scotland and England. In collaboration with English designer William White, Wolff planned an idealized soup kitchen and dining hall. Food preparation took place in a sanitized area equipped with steamers and roasters, hot plates, meat slicing station, and specialized hotel kitchen larder and scullery. Clients could wash up, receive food at the serving window, and eat at trestle tables on the premises or buy carryout meals, which servers placed in vessels lined with a hot water cell to maintain temperature.

Twentieth Century: War on Hunger

Political instability increased the demand for soup kitchens. In 1931, in the novel *The Good Earth*, Pearl Buck reflected on her life in China, where she grew up on the Presbyterian mission field with her parents. From her memories of turmoil accompanying the Boxer Rebellion of 1900, she described the terror of southern refugees to Kiangsu Province, presumably in Nanking. They carried begging bowls and sought public kitchens, where aid workers cooked huge cauldrons of rice for distribution. A security force halted exploiters from buying cheap food for slopping hogs.

During World War I, refugees from Galicia overran Vienna, forcing Austrians to come to terms with hungry families roaming the city. Social reformers Sophie Grünfeld and Hermine Kadisch opened kosher soup kitchens featuring menus of beans, dumplings, potatoes, sausage, and soup. A sliding scale distributed cost to the poor and middle class, who paid what they could afford. Kadisch stretched supplies during the lean times of 1917–1918, when a volunteer staff served 13 million low-cost meals and 3 million free dinners.

In the 1930s, with North America in the throes of the Great Depression, food insecurity plagued the lowest class and the newly dispossessed. In contrast to the private charity system that had weathered a 16 percent jobless rate during the depression of the 1890s, the 30 percent unemployed during the Depression ate up resources. Food doles and soup kitchens, such as the one that Marjorie

Merriwether Post subsidized in New York City's Hell's Kitchen and the Gleaners' Aid shelter and kitchen that radio evangelist Rosa Artimus "Mother" Horn opened at 132nd Street and Madison Avenue, survived the first two winters by feeding more than 48,000 people. The protracted demand on relief rolls ultimately exhausted the system.



Volunteers serve dinner to the homeless at a soup kitchen in San Jose, California, during the economic recession of 2008–2009. Most associated with the Great Depression of the 1930s, on-site meal service for the needy actually dates to ancient times. (*Christian Science Monitor/Getty Images*)

Another altruist of the time, reformer Dorothy Day, a founder of the Catholic Worker Movement and author of *House of Hospitality* (1939), led a reform drive to ease the suffering of New York City's poor. In 1934, she launched St. Joseph's House of Hospitality, a Christian waystation to succor wanderers of the city's Bowery. In a challenge to readers, she referred to her public kitchen as a "Christ's room." The establishment of Day's Chrystie Street Shelter initiated the opening of 30 rescue missions nationwide to dispense hot meals.

Recent Outreaches

The tradition of staffing and supplying public kitchens remained a form of charitable outreach to the world's underfed throughout the last decades of the twentieth century. Between 1980 and 1990, with New York City's homeless population escalating rapidly, nongovernmental agencies staffed 136 public pantries and 104 soup kitchens distributing more than 78,000 meals per week to stem the crisis. To expand the offerings of feeding stations, volunteers such as Gleaners and Second Harvest collected surplus groceries and restaurant donations.

In the 1990s, the American Dietetic Association studied emergency food programs to assess the quality of service to the poor. Despite the guidelines of the 1989 Recommended Dietary Allowances for adult males, staff ignored hand washing, thawing, and reheating standards before ladling up meals at five locations near New York University in midtown Manhattan. Menus dependent on donated items varied in nutrition, typically low in carbohydrates, folic acid, and vitamin C and high in fat and protein. Observers concluded that charitable institutions needed the services of dietitians to ensure food purity and nutritional content.

Worldwide, altruism has taken numerous forms to end the obscenity of starvation amid plenty. In Ajmir, India, locals honoring the anniversary of a saint held a scramble feast. They set up two cauldrons to cook rice and butter for distribution to beggars. The giveaway concluded with volunteers who wrapped themselves in thick coverings and climbed into the pots to scrape out the remains of the meal. An effort organized in Sofia, Bulgaria, to aid orphans, pensioners, the disabled, elderly, and jobless began with the social activism of Donka Paprikova, Bulgaria's Mother Teresa. On October 21, 1996, her team of volunteers started a soup kitchen with donations of garden vegetables and offered bread, fruit, soup, and yogurt to more than 200 recipients twice a week. Among the Bushmen of the Nyae Nyae Conservancy of Botswana, the cooking and distribution of soup and bread to children at Schmidtsdrift early in 2001 provided fuel to help pupils attend class. Those who skipped class did not eat.

Amid plenty in the United States, on Super Bowl Sunday in January 1990, Brad Smith, a second-year seminarian and intern at Spring Valley Presbyterian Church

in Columbia, South Carolina, originated the Souper Bowl of Caring, a religious and laic campaign to pass the soup kettle and collect food for the hungry. The annual project, supported by a toll-free number and Web site, channeled some of the enthusiasm for sport into a will to nurture and uplift. Advocated by former presidents and first ladies, the National Football League, and a host of celebrities, donations for soup kitchens exceed \$10 million annually.

See also: Rumford, Count; Soups; Soyer, Alexis.

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Soups

Whether cold or hot, thick or clear, soups offer cooks a flavorful, aromatic menu item to suit a variety of meals and snacks. Ancient pottage recipes hold so high a reputation that historians refer to the cradle of human life as “primordial soup.”

Ancient Fare

A fireside staple from 7000 B.C.E., the first liquid meals emerged from pit cookery or stone boiling, the dropping of heated stones into pouch hides, wood troughs, turtle shells, or the stomachs of large animals. Analysis of residue in pottery

containers identified acorns, animal bones, chestnuts, grains, lentils, and root crops as standard ingredients softened by boiling. An ancient classic, pea soup, involved the mashing of the peas to absorb herbal, meat, and vegetable flavorings.

By the Iron Age and the invention of heat-proof, leak-proof cookware, soup filled bellies along the Mediterranean and in Europe, China, India, Japan, Korea, and Nigeria. Herodotus, the fifth-century B.C.E. Greek historian, viewed the Scythians at an economic fireside ritual heating ox flesh in the paunch over a fire of the ox bones. In 200 B.C.E., Chinese bitter-and-sour soup concocted from bean curd and vegetables cost only a pittance. Herbalists recommended its healing properties. Roman home cooks specialized in fish soup flavored with herbs and wine, which paired with salad, a classic complement.

Soups Through the Ages

To save fuel and squeeze food value from sparse ingredients, medieval chefs retained Byzantine pottage recipes, which flourished in Catalonia, England, France, and Italy. A cauldron occupied the fireplace hob and remained bubbling day by day, replenished with leftovers from the last cooked meal. Peasants fished out chunks of meat and vegetables with their fingers and tipped bowls toward the mouth to drain the juice. A messier version of sipping, the sopping of bread crusts in broth rescued the dregs from the bowl. In the 1450s, Turkish consumers sipped cups of soup as handy snacks, particularly in blustery weather.

During the Renaissance, vendors ladled bowls of restorative broth or soup in France. In 1765 in Paris on the Rue Bailleul, four blocks north of the Île de la Cité, vintner A. Boulanger opened a bistro devoted to bouillon and *pot-au-feu* under the title *restaurant* (restoring), a dispenser of *restoratifs*. Refined buyers dipped soup from a tureen and ate their servings with long-handled soup spoons. Asian and Baltic dessert makers simmered their own savory blend from adzuki beans, bananas, coconut, melon, and tapioca. Iberian gazpacho reduced elements of a salad—cucumbers, onions, peppers, tomatoes—into a chilled slurry seasoned with oil and vinegar, pepper, and salt. Scandinavian chefs diversified northwestern Asian and European dinner recipes with fruit soup simmered from prunes and

raisins and dressed with cream, dumplings, spices, and wine.

In the late 1700s and early 1800s, high-minded British relief workers in London and Glasgow attempted to raise the standard of living for the destitute and refugees with daily handouts. A recipe from optician William Kitchiner's *Apicius Redivivus: The Cook's Oracle* (1817) yielded 250 gallons (950 liters) of soup by flavoring stewed beef strips and knucklebones with black pepper, celery, flour, leeks, salt, and split peas. The cauldrons fed 600 families.

The American Melting Pot

Waves of immigrants to North America added a variety of cooking styles, from creamy French seafood bisques, bouillabaisse, and veloutés to Chinese egg drop soup, Greek lemon chicken soup, Hungarian goulash, Tamil mulligatawny, Italian minestrone, English curried carrot soup, Russian borscht, and hearty Newfoundland seacoast chowders, thick with clams, crabs, and fish. National dishes featured distinctive ingredients—hominy and tripe in Mexican menudo, stewing hens in Scots cock-a-leekie, bean curd in Japanese miso, potatoes in French vichyssoise, peanuts and pumpkin in African purees, and celeriac in Dutch *snert*. Among the Pennsylvania Dutch, a steaming tureen of soup symbolized community and sharing a one-dish meal with guests. The North American elite adopted soup at the opening course of a heavy meal as a civilized method of arousing the appetite.

In the 1750s, while woodsmen had the luxury of cooking an outdoor hunter's stew, explorers and naval provisioners purchased portable soup, or pocket soup, a defatted, dehydrated paste of boiled meat, rice, and vegetables topped with dried salt pork and peppercorns. Galley cooks reconstituted the pantry staple in a stockpot by adding a quart of water. A forerunner of bouillon cubes, canisters of portable soup traveled with Captain James Cook to the South Seas in 1768 and Lewis and Clark to the Pacific Coast in 1804. By the 1850s, canned soups had expanded the selection of quick meals for cowboys, frontier cavalry, and hospital patients.

In 1897, John Thompson "Jack" Dorrance, a chemist trained at the Massachusetts Institute of Technology and Göttingen University, revolutionized

convenience foods by inventing the first condensed soups in Camden, New Jersey, for the Joseph A. Campbell Preserve Company (later renamed the Campbell Soup Company). Campbell's became one of the most respected brands in U.S. history. The reduced bulk of condensed soup lowered the cost of canning and transporting. For 10¢ per can, homemakers could choose water or milk as the liquid that reconstituted one of 21 varieties of prepared soup and add individual touches to the mix, such as chopped boiled egg, minced onion, or orzo pasta.

In May 1900, Campbell's soups won a bronze medal at the Paris Exposition, where soup makers exhibited equipment for extracting flavor from meat. Four years later, company publicists connected soup with children and motherhood by publishing a "Campbell Kids" ad campaign. During World War I, Dorrance added his food acumen to the three-year effort of the U.S. Food Administration to reduce waste and increase nutrition in army rations. In 1917, the company shipped 45 percent of its soups to Europe.

During the Great Depression on the South Carolina coast, shore restaurants had limited access to the ingredients of their signature dish, she-crab soup, made from crab and roe. The cook often resorted to the burrowing gopher tortoise, called "Hoover's chicken," for the makings of soup. After 1939, instant soup reduced the cumbrous work of chopping and stirring the ingredients of nutritious broth. Within five years, when Lipton offered three flavors of soup mixes at under 10¢ each, revenue from soup sales rose by 750 percent.

Recent History

The salad bar, first advertised in 1951 in Springfield, Illinois, began offering the soup-and-salad combination, a satisfying meal light on calories and cost. Gradually, buffet items included chili and soup garnishes—bacon bits, bamboo shoots, black olives, croutons and melba toast rounds, grated cheese, green onion slices, and a sprinkle of red pepper. The appeal of fragrant hot soup increased restaurant traffic for retirees and couples with young children, who relished soft vegetables in broth.

In the heyday of space travel, astronauts rehydrated and squeezed soup from tubes packed in Estonia, such

Recipe: Chicken Noodle Soup

In 2 quarts of boiling water, poach four boneless chicken breasts. Remove the chicken pieces. Chop three of the chicken breasts and return them to the stock. Cool the fourth piece. Add to the pot 1 tablespoon each of freshly chopped parsley and rosemary and 1 teaspoon each of dill weed and sea salt. While the soup is simmering, sprinkle the surface with black pepper and granulated flour and stir vigorously. Add 1/2 cup of slivered baby carrots and one celery heart with its leaves. Shred the cooled chicken breast in a food processor and blend it into the soup. Shortly before serving, stir in 1 cup of thin egg noodles and simmer until tender.

as the borscht dispensed aboard the Soviet Soyuz 19 mission in 1975. By the start of manned U.S. Apollo missions in the late 1960s, hot water dispensers made moistening dried foods and spooning cream of chicken “moon soup” from bowls easier and more normal. The Japanese Aerospace Exploration Agency made its own advances, including ramen noodles. For meals of black bean and lentil soup, special trays held pouches and utensils in place. Thermostabilization destroyed enzymes and microbes that could cause spoilage and debilitate the crew.

In the 1990s, the growth of the soup industry derived from the convenience store and workplace microwave, where consumers could heat ramen with water or ready-to-eat soup in plastic bowls. Cooking magazines and ads from Campbell and Knorr featured canned and dry soups as additives to roast meats and vegetable casseroles, such as the classic holiday green bean dish dressed with cream of mushroom soup and topped with french fried onions.

To accommodate the health conscious, soup manufacturers in the 2000s offered a variety of low-sodium or salt-free servings, as well as vegetarian fare and soups free of trans fat. The Slow Food movement introduced young couples to the ease of electric slow cooker preparation, which extended over the workday the simmering of a one-pot dish—a boon to two-wage-earner households.

See also: Arctic Diet and Cuisine; Chowder; Crackers; Cussy, Louis, Marquis de; Rumford, Count; Soup Kitchens; Soyer, Alexis.

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Sourdough

A complex microbiological union of fermentation and leavening in wet grain, sourdough demonstrates the value of experimentation from the beginning of bread history. In Egypt in the twenty-sixth century B.C.E., wild yeast from vineyards or gardens drifted into dough, producing a light texture and memorable piquance. In the port of Alexandria, the world's first commercial ovens produced thousands of loaves per day. At the Great Pyramids in Giza, commercial distributors fed 30,000 laborers on bread cooked in earthen jars over pit fires. According to Exodus, around 1450 B.C.E., some 600,000 Hebrew workers fled Egypt by night, leaving behind their sourdough starter.

In the Bronze Age, Sumerians thrived on sister skills—brewing and baking yeast bread. Commercially, the mixing of sourdough required a bacteria-rich inoculum, or starter, from previous batches or from beer or wine. To keep the starter viable, preparers fed the mass fresh leavening. By 800 B.C.E., the souring of dough reached Western Europe. For tart savor and fragrance, Greek and Roman bakers permeated the mass with lactic acid from the acetobacteria on grapes and allowed the flora to develop spontaneously for up to 24 hours. For loft and crumb, they relied on *Candida* and saccharine yeasts, which boosted the volume of dough by metabolizing sugar. The concept spread as far west as Morocco and Iberia, east to Arab lands and India, and south to Ethiopia, home of teff pancake bread.

After the barbarian invasions of the sixth century C.E., public bake ovens disappeared until twelfth-century monastic kitchens revived artisanal breads. Medieval European sourdough versions—German *sauerteig*, Polish rye, Italian *biga*-flavored ciabatta and *panettone*, braided Jewish challah, and nutty-tasting Belgian *desem*—accelerated the method of leavening with natural microflora with quick-acting compressed yeasts. During a grain shortfall in 1443, rye sourdough, reputedly named for the Swiss baker Pumper Nickel, substituted mixed-grain bread for pure-wheat loaves.

The popularity of sourdough bread after the 1849 California gold rush emerged from the makeshift cookery of pioneers and gold panners. Carried up the Pacific Coast to the Yukon and Alaska, starter bore a value equal to tobacco or flint and steel for fire making. Borne in buckskin pouches close to body heat or in wooden kegs jouncing in chuck wagons, the dough remained unfrozen, ready for the day's bread and cake baking or flapjack making.

One of San Francisco's pioneer entrepreneurs, Isidore Boudin, fed hungry gold seekers from his French bakery, which employed native wild yeast. He followed artisanal Burgundian techniques to produce a crusty loaf. The Boudin family operated the nation's largest sourdough industry. During the 1906 San Francisco earthquake, his wife, Louise Erni Boudin, saved the "mother" dough containing the original leaven.

Into the twenty-first century, San Francisco maintains fame as the sourdough capital. White doughs soured by the original *Lactobacillus sanfranciscensis* yield the familiar tangy accompaniment to chili and clam chowder. Health advocates promote sourdough biscuits, coffee-cakes, loaves, and rolls as more nutritionally complete and more easily digested than industrialized gluten breads.

See also: African Diet and Cuisine, Sub-Saharan; Beans and Legumes; Bread; Chowder; Fermented Foods; Wheat.

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South American Diet and Cuisine

South American foodways remain anchored in ancestral patterns of edibles from sea, river, and land. From 10,000 B.C.E., indigenous peoples relied on chayote, peanuts, beans, squash, tomatoes, yucca, oca tubers, dried sea bass, amaranth, chilies, and sweet potatoes for sustenance. Guava, mangos, papayas, passion fruit, and melons contributed natural sweets to drinks and snacks.

In the Andes highlands, alpaca and llama meat and game dried readily into jerky. The Amazonian heartland teemed with rain forest acai palms and cashew nuts and the world's largest array of fresh water fish, including dorado, baitfish, bass, and catfish. Regional dependence on corn and potatoes and military rations of quinoa preceded the post-Columbian explosion in New World starches on European menus, the first east-west fusion cuisine from the Western Hemisphere.

To bland carbohydrates, South Americans added chili peppers, roasted guinea pigs, corn beer, and clams and goat meat steamed in a *huatia* (pit oven). The addition of toasted ants derived from a closeness with nature and the incorporation of insects into a heavily vegetarian diet. Colonial sugar plantations enhanced beverages with rum and honeyed desserts with a granular sugar and molasses. Wheat, chickpeas, oats, lentils, and rice from Spain expanded sources of bread and hot porridge.

Into the twenty-first century, South Americans rely on cassava for flour. The growth of coffee in Brazil, producer of 33 percent of the world's beans, supplies the region with a full-bodied beverage, which they brew strong and blend with evaporated milk. Three alternatives, chamomile tea, passionflower tea, and yerba maté (*Ilex paraguariensis*) with milk and sugar, promote wellness and boost immunity.

Family-centered lunches stress sociability and shared dining on heavy entrées —*ajiaco* (potato soup) and corn fritters or empanadas (meat turnovers) for starters. The second course pairs grilled beef with rice and black beans and leafy sorrel. The day ends with a leisurely dinner that draws guests and family into conversation. Flan, milk cake, fried bananas, or berries and cheese satisfy appetites without overfilling.

In the north, Colombian and Venezuelan restaurants display a New World preference for traditional corn *arepa* (griddle cakes) and plantain chips alongside the western Mediterranean influence of cheese, garlic and parsley, onion, and olive oil, particularly in chicken or beef stew. Brazilian cooks fry chorizo (sausage) and cassava and steam collards to serve with *feijoada*, a one-pot fusion dish consisting of black, red, or white beans, cabbage, carrots, tomatoes, palm oil, and meat and based on cooking styles from Africa and India. Guyana absorbed from African slaves and Asian and Portuguese colonists a preference for flatbread, Caribbean pepper pot stew, and curried rice. Andean cuisine depends on some 200 types of potatoes for entrées and finger food and a topping of chopped fresh *aji* (pepper) and onion into a salty salsa.

Farther south, Argentine beef dominates menus with *asado* (barbecue), grilled sweetbreads, and prime cuts, especially baked flank steak, a national entrée. Because of heavy immigration from Europe, native restaurants advertise Italian pasta and polenta, German schnitzel and lager, Dutch gin, Caribbean coconut rice, and Chinese *yakisoba* and ramen noodles. Tea rooms offer British tea served with *dulce de leche* (milk caramel), whipped cream, and scones. Patagonian menus feature king crab, lamb, goat, and venison seasoned with *chimichurri*, a condiment of garlic, cilantro, and vinegar, and bilberry or strawberry desserts. The Pacific Coast cooks claim their native heritage in ceviche, shrimp and fish marinated in citrus juice.

See also: Beef; Chocolate; Corn and Maize; Inca Diet and Cuisine; Peppers; Potatoes; Tortillas.

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[Soyer, Alexis \(1810-1858\)](#)

London's Reform Club chef Alexis Benôit Soyer turned food service into rescue efforts during the Irish famine and the Crimean War.

A native of Meaux-en-Brie, France, Soyer apprenticed in restaurant kitchens in Paris at age 11 and advanced to deputy chef at the French Foreign Office. At age 20, he began cooking for British royalty and Members of Parliament. His innovations ranged from oven thermometers, steam dumbwaiters, and gas stoves to pantry chambers chilled with circulating water. In June 1838, he catered a breakfast for 2,000 following Queen Victoria's coronation. Soyer compiled 2,000 recipes, including such comforts for invalids as nettle soup, and composed basic instructions on how to get ten servings from each fowl and how to carve beef or lamb to get the leanest slices. For beverages, he praised tea for encouraging sobriety in England and mocked British efforts to make coffee. A review in the London *Times* lauded the cook for stressing that good food is a pleasure and a boon to health.

Soyer inveighed against England's rejection of vegetables from the menu. His fruit and vegetable selection showcased the firm red potato and promoted young and tender brussels sprouts, carrots, mangels, onions, and turnips. For fruit jelly, he preferred isinglass (from fish air bladders) as a jelling agent and sought to retain as much of the natural fruit color as possible. He recommended endive and spinach for good health and cacao, Irish moss, and kelp for economy. For variety, he encouraged the use of continental favorites, such as Jerusalem artichokes, salsify, and truffles, which he simmered in champagne. His instructions for cooking artichokes and white haricot beans followed the French style of flavoring

with fines herbes (chervil, chives, parsley, and tarragon) or sorrel. His writings about ancient cookery impressed on readers the importance of lentils to human nourishment.

At the onset of the Irish Potato Famine of 1845, Soyer mustered volunteers to devise an orderly feeding system to replace mismanaged relief efforts. While Quakers transported 180 gallons (680 liters) of soup daily to the countryside, for city meal service, he devised barrows and soup carts, the first urban soup kitchens to feed the starving. In a 200-foot (60-meter) mobile kitchen set up opposite the Royal Barracks in Dublin, he housed an oven and boiler, where he conserved funds by steaming vegetables. On a tight budget, he introduced swedes (rutabagas), a much-neglected root crop. From a giant cauldron, his staff distributed quart servings of soup to 26,600 people, who lined up for hand washing and daily meals. A phalanx of tables held 100 quart-sized bowls alongside spoons attached by chains. From April 6 to August 14, 1847, he distributed 1,147,279 meals. The British government purchased his mobile kitchen for the use of Dublin's South Union Relief Committee. Based on his experiences, Soyer published a monograph titled *Charitable Cookery, or The Poor Man's Regenerator* (1847). Among his recommendations for the poor, he stressed the value of brown bread, cornmeal, fish, and ox heart and liver, cheap foods that the proud Irish were embarrassed to purchase.

A celebrity cook, Soyer remained active in kitchen design and in food service to the needy. He summarized simple meal planning in *A Shilling Cookery for the People* (1854), in which he regretted that the poor relied more on bread and cheese than on wholesome vegetables. In support of soldier wellness, morale, and food safety, Soyer traveled to Turkey to organize the British army hospital kitchen at Scutari during the Crimean War. In addition to demonstrating low-budget recipes and training regimental cooks, he designed a field stove for feeding 2,000 British soldiers in two hours. The stove remained a field staple until the Gulf War of 1990. Late in his career, he lectured on the need for dietary reform for the military. He sketched plans for a mobile field canteen and planned a model kitchen at Wellington Barracks in London. Despite some commercial success, such as Crosse & Blackwell marketing his signature sauce and relishes, Soyer died broke at age 48 from alcoholism.

See also: Breakfast; Cookbooks; Famine; Seacole, Mary Jane.

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Spices

The rage for spices transformed culinary history, sending Asian and European fleets around the world in search of intriguing taste sensations.

After 10,000 B.C.E., Neolithic hunter-gatherers prized mustard seeds and juniper berries to deodorize corpses for burial. The two flavorings entered culinary use as an afterthought. From as early as 3000 B.C.E., Assyrians imported cassia from southern India and revered sub-Saharan sesame as a divine flavoring. Egyptians honored dead pharaohs with peppercorns in the nostrils and spiced embalming salts for permeating the torso cavities and soaking the limbs and skull. Nile residents also cooked curative and aromatic dishes with cumin, marjoram, calamus (sweet flag), and anise to increase well-being and longevity. From 2580 to 2560 B.C.E., desert overseers allotted Asian spice to laborers to promote steady work on Cheops's pyramid, the tomb of the Pharaoh Khufu.

Spice purchasing involved lengthy travel by ship, caravan, or a combination of the two. Traders bore fenugreek and *mahlab* (dried cherry stones) from Turkey, licorice root and star anise from China, poppy seed from the Middle East, mastic resin (gum arabic powder) from Chios, calamus from Egypt, sumac from Iran, and caraway from the Sahara. The most varied stock came from India, where

markets sold *amchur* (powdered mango), red *kokum* (mangosteen) and tamarind rind, *ajwain* (carom seed), nigella (black cumin), orrisroot oil, and zedoary, a bitter rhizome.

The Fertile Crescent developed a cuisine tinged with foreign flavorings. After 2400 B.C.E., Sumerians traded to the Moluccas for cloves, cubeb pepper, and galangal, a rhizome cooked into a tonic. Syrians coveted Asian spices as aphrodisiacs around 1700 B.C.E., at the same time that spice cultivators in Crete plucked the stigmas from crocus blooms to extract sweet saffron, a yellow colorant from Kashmir that Assyrians applied to 90 diseases. Around 1230 B.C.E., Hebrews anointed the Ark of the Covenant with cassia oil (aromatic cinnamon) from the Malabar coast, India's southwestern trading nexus.

In 950 B.C.E., northern Arabs led camel and donkey trains through India to China over the Incense Route to buy goods marketable to Greeks. Evolving land and maritime routes joined Arabia and Baghdad with spice depots in Malabar, Guangzhou, and the Spice Islands. Thus, Arabs controlled the world's commerce in the most valuable comestibles, including delicate yellow mace, the powdered aril of the nutmeg.

After 600 C.E. Chinese and Arabic gourmands envisioned heaven as a grand orgy of aromas and flavors as disparate as aromatic aloeswood and cardamom, a flavoring for sweets. Alexander the Great redirected spice profits from the Far East through Alexandria, the center of Mediterranean commerce. Silphium, one of the standard flavorings, traveled along Greco-Roman trade routes as far north as Gaul. Balance of trade drained off much of Roman wealth to Egyptian and Arab merchants until Roman sea captains mastered trade winds and journeyed safely to India and back with pepper.

Rise of European Cuisines



A spice vendor in the southwestern Indian state of Kerala displays pepper, ginger, cinnamon, and star aniseed. Kerala and the Malabar Coast have been a major source of high-quality spices and a vital stop on Asian trade routes since 3000 B.C.E. (*EyesWideOpen/ Getty Images*)

After the fall of Rome and the rise of Islam in 622 C.E., Muslims spread their religion over old spice routes and revived Arab commerce. Returning crusaders found Europe in a gastronomic slump that resurrected warriors' memories of Palestine and Cyprus. Soldiers embroidered tales of Middle Eastern pleasures with samples of cinnamon, jasmine, sugar, nutmeg, and artemisia, a bitter flavoring. As much as Christendom longed to reclaim the Hebrew capital of Jerusalem from Saracen control, Christians lusted for Eastern luxuries, which the wealthy deemed their birthright. Recoiling from such greed, the Benedictines esteemed the unadorned plain food of peasants as a sign of true Christian humility and poverty.

To relieve the monotony of medieval boiled trout and peacock pie, chefs generated savor with cinnamon, fenugreek, nigella, sugar, mace, and nutmeg. Recipes for meat marinade called for soaking haunches in honey spiced with cloves, ginger, and black pepper. Spice added new interest to condiments, jam, and sauces and to such sweets as gingerbread and gingersnaps, cookie recipes that crusaders brought from the Middle East. Meals ended with hippocras, an after-dinner wine tinged with cinnamon and heated as a nightcap.

Dynasties gambled huge investments on the planting of new spice-growing colonies in the Indian subcontinent and Java; British, Dutch, Swedish, and Portuguese power mongers jockeyed for control of trading routes to Sumatra and Malabar. In 1271, Marco Polo journeyed from Venice to China to investigate trade possibilities. The scramble for dominance of cassia, black pepper, ginger, cloves, mace, cinnamon, sugar, and nutmeg in Venice, Lisbon, and Amsterdam produced the first global culinary conflict and possibly spread *Yersinia pestis*, the vector of the Black Death that followed sailors to European port cities.

Spice marketing became the domain of pharmacists, whom Italians called *speziali* (spice dispensers). After Spanish explorer Hernán de Cortés discovered vanilla in Aztec Mexico in 1519, German doctors prescribed the aromatic bean as a cure for impotence. Medicinal recipes listed mastic, cloves, and Indian sesame among apothecary simples that purified foods and treated coughs, gastric ills, headache, and toothache. Physicians advised cooks on the appropriate balance of food with additives such as Persian asafetida, a flu fighter, and allspice, a Jamaican dried fruit that corrected gustatory excesses threatening sleep, digestion, and sexual potency. The more cures attached to spices, the greater the rush to profit from them.

Routes to Spice Markets

At the beginning of the age of discovery, travelogues tweaked European curiosity about Javanese mace and Indonesian pepper vines. Tales from *The Travels of Sir John Mandeville* (1357) inspired Genoan navigator Christopher Columbus to petition the Spanish court of Ferdinand and Isabella for funding to explore new spice routes to the Orient. His sole encounter in 1492, *aji* (chili or green pepper), seemed insignificant in comparison with the flavorings of India and Sumatra. With a more pragmatic eye for profit and avoidance of Ottoman monopolies, Portuguese explorer Vasco da Gama worked his way around southern Africa toward caches of spice in India and Malaysia. The resultant stampede to grow spices in the Americas aroused another world evil, slavery, the source of labor for plantations in Jamaica, Barbados, and Brazil.

The late Renaissance advanced medieval interest in taste with a burst of sense

impressions from fragrance and color. Reformulated recipes boosted the price of fragrant sandalwood, aloeswood, and yellow turmeric and saffron, the two chief additives to rice and cream desserts. Aristocrats and parvenus flaunted wealth with a display of spiced rotisserie meats for entertainment and ambassadorial receptions. To corner the market on trans-European spice dispersal, Venice outflanked the merchant republics of Florence, Genoa, and Pisa, turning a small marine village into a world commodities player. Into the holds of Venetian galleys tumbled goods traveling northwest from Tripoli and Tyre, Crete, and Alexandria.

While chili peppers gained slow recognition for enlivening bland cuisine, stores of saffron and nutmeg commanded high prices in Tudor England. In 1603, physicians prescribed the yellow and brown powders to treat bubonic plague. The difficulty in pollinating vanilla left Mexican planters in control of a new fad in aromatic cookery, especially the preparation of hot chocolate, a trendy drink throughout Europe. Similarly, Brazilian vendors monopolized the flow of annatto, an exotic flavoring and food coloring for rice dishes.

In 1748, Bengal (now Bangladesh) fell to the British East India Company (BEIC), the beginning of the collapse of Dutch East India Company control of commercial traffic in cloves, pepper, cinnamon, nutmeg, and mace from Bengal, Malabar, Persia, and Surat, India. The BEIC outdistanced French and Portuguese commercial efforts, usurped Danish trade depots, and, in 1798, monopolized global food marketing. In 1813, the Swedish East India Company capitulated to the BEIC control of cinnamon, pepper, ginger, and anise, source of a flavored aperitif. By 1839, the British flag flew over ware houses in Burma and Aden, from which clipper ships delivered spices, sugar, and tea around the world.

In the United States, McCormick & Company, a Baltimore distributor, marketed a *mélange* of aromas and tastes in its array of spices, including liquid mint, maple, rum, and lemon flavoring, beginning in 1896. A handy source of chili and tempura spices, enchilada and fajita spice, crab boil, tagine mix, orange peel, and sweet-and-sour and Thai rice flavorings, the McCormick family of products sold under one label the world's most-sought-after ingredients. Similarly comprehensive, the products of British Pepper & Spice, the largest spice retailer in the United Kingdom, supplied the grocery chains of Tesco, Sainsbury, and Marks & Spencer with Mexican, Indian, Thai, Malaysian, and Mediterranean

taste enhancers, including gourmet peppers—Sumatran *lampong*, *sarawak* from Borneo, and Ceylonese *sambal* chili.

The availability of spices in the modern era belied the struggles and onepmanship of past centuries. Grocery stores stocked unassuming bottles of goods as disparate in provenance as Choctaw *filé* powder from the North American sassafras tree and Jamaican jerk spice, a dry rub combining pepper with allspice, a Central American berry. Internet sales made available the unique smells and tang of idiocuisine—the fragrant *merkén* of Chile, Australian aniseed myrtle and fruit-flavored olida, and African Grains of Selim, a pungent pod from Senegal. Asian specialties—Vietnamese coriander, wasabi (Japanese horse radish), Chinese five-s pice powder, Szechuan pepper, and garam masala, an Indian blend of pepper, cloves, mace, cumin, cardamom, nutmeg, anise, and coriander—enrich the culinary range of chefs dedicated to multicultural cuisine.

In 2012, studies of spice restored respect for ancient recipes and natural medicines. Nutritionists reclaimed nutmeg as a treatment for swollen joints and cloves as a temporary first aid for toothache. Bacteriologists recognized the antimicrobial strength of allspice and oregano against salmonella and listeria.

See also: Abreu, António de, and Francisco Serrao; British East India Company; Crusaders' Diet and Cuisine; Dutch East India Company; Gama, Vasco da; Maritime Trade Routes; Pastry; Portuguese Diet and Cuisine; Salt; Silk Road; Tudor Diet and Cuisine.

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Standish, Miles (ca. 1584-1656)

One of the founders of Massachusetts and New England's first soldier, Miles Standish pioneered the North American corn trade.

A native of Duxbury, Lancashire, (or possibly the Isle of Mann), Standish entered the military at age 17. In Holland during the English and Dutch war against Spanish invaders, he advanced to the rank of captain. In summer 1620 at Leiden, he accepted the post of military adviser to 102 Pilgrims, who sailed aboard the *Mayflower* to Cape Cod, Massachusetts, in search of freedom from religious persecution. After the nine-week Atlantic crossing, a shortage of food and beer forced the company to abandon plans to sail to the Hudson River. On November 11, Standish signed the historic Mayflower Compact, a social contract among 41 male passengers intended to safeguard the colony from dissension and disorder.

As a likely spot for settling, Standish chose Plymouth, on the cape's western shore, a former Indian compound abandoned after plague wiped out the residents. Standish's efforts helped save the English immigrants from malnutrition. At Patuxet, Massachusetts, on November 16, 1620, the newcomers rejoiced in the discovery of broiled herring in an empty wigwam and a mound of sand adjacent to a harvested cornfield. Inside they dug out a basket containing cranberries and three or four bushels of an unfamiliar grain—husked Narragansett corn, a dried staple that the aborigines of southern New England had grown since 700 B.C.E. Reconnoitering two Indian houses, Standish commandeered beans and more corn and led hunters who shot an eagle, ducks, and geese. A year later, the Pilgrim settlers learned that the Wampanoag bore a grudge against them for food pilferage, which tribes ranked as a serious crime.

Standish proved his leadership of the citizens' militia during the winter, when only a handful of colonists remained healthy. In February 1621, as more Pilgrims fell sick from exposure and starvation, he chopped wood and cooked for the ailing. Among the victims, his wife Rose died. He buried her alongside other colonists, of whom only 55 survived. Standish used corn as an exchange medium when he purchased his first dairy cow from Edward Winslow, the colony's first cattle agent. On April 2, the Wampanoag donated parched corn, roasted fish, and venison as tokens of friendship. The English reciprocated with biscuit, butter, and

“strong water,” a general term for fermented beverages.

In spring 1621, Squanto joined Chief Massasoit in training the Pilgrims in fishing and in growing and storing corn. The English planted their first garden on 20 acres (8 hectares) of thin, rocky soil. By placing kernels in hills, the newcomers improved corn pollination. Squanto demonstrated burying a dead herring or shad in each mound to help stalks produce ears. The pilgrims also sowed 6 acres (2.4 hectares) in barley and peas. Squanto introduced the colonists to New England traditions—digging for clams and tapping maple trees for sap.

After a season of half rations, plentiful clams, eels, lobster, and various game ensured survival. The sharing of food with the Wampanoag in early October 1621 set the model for Thanksgiving, a uniquely American holiday. Before the feast, four sharpshooters went fowling for birds. In anticipation of a treaty with the Indians, Standish invited Massasoit, Samoset, and Squanto to a celebration. The Indians, in accordance with tribal custom, brought their whole clan of 90 people. To supply a three-day feast, Massasoit donated Canada geese, five deer, grape wines, shellfish, and wild plums. Standish introduced the chief to dining at a trestle table instead of on floor mats.

With the arrival of 93 more colonists in July 1621, the Pilgrims enlarged their cornfields. Until the next harvest, they subsisted on berries and venison. Standish abandoned the communal living style and encouraged cultivation of individual plots. In February 1623, he traveled by boat down the coast to a distant tribe at Namasket (Middleborough) to barter for corn, his introduction of New England’s coastal food trade. A successful harvest in 1624 set up the colony to barter for Indian furs, which vessels carried back to England. The following year, Standish negotiated a buyout of the colonial contract that freed the Pilgrims of London investors. Throughout the 1630s, the colony enjoyed high commodity prices. Standish remarried and retired to his farm, where he died at age 72.

See also: Dried Food; Fish and Fishing; Wine.

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Storage, Food

Whether in a box chest, calabash, granary, in-ground urn, pantry, spring house, or hillside lean-to, food storage preserves staples and extends shelf life for emergencies as predictable as blizzards, floods, hurricanes, and typhoons and as unexpected as earthquakes, volcanic eruptions, acts of terrorism, and nuclear war.

The Harappans of the Indus Valley practiced food preservation as early as 2500 B.C.E. by separating types of beans and grains into bins and ventilating them. From 100 B.C.E. to 100 C.E., the sheds that the Iceni Celts of Great Britain attached to long houses held domestic supplies and smoked meats and fish. In this same era, Roman households erected iron stands to hold sealed amphorae of fish sauce, oil, olives, vinegar, and wine. In medieval Russia, the icehouse added more options for food variety, such as caviar, corned beef, and sturgeon.

Gervase Markham's compendium *The English Huswife* (1615) lauded the hovel, a simple shed, lean-to, or shelter constructed from eight crotchets or braces topped with spars. He suggested that builders craft semipermanent shelters to guard hearth fuel, herd animals, and grain bags and bales and urged roofing the pantries in bracken, brush, and furze. For the smallholder, his ideal storage shed suited stacks of pease and vetch, a common famine food from the early days of the Fertile Crescent. In *The Land of England* (1979), British domestic expert Dorothy Hartley added that makeshift thatching could come from heather, rough grass, or willow bark. Tight casks and tin or japanned canisters kept biscuit, cheese, rye, sugar loaves, and yeast safe from moisture.

To shelter foodstuffs at the height of quality and flavor, Native Americans found unique methods of storage in a woven mocuck (bark box), hide saddlebag, or parfleche, a rectangular pouch used for travel. The Pee-Posh of the lower

Colorado River, the Yukon of northwestern Canada, and the Hare of Alberta, added pantries to the hogan, igloo, or lodge as storage space for baskets of berries and grain or as a shelter for buffalo chips, firewood, dried fruit and herbs, fodder, smoked meats and fish, and vegetables, such as camassia and wild carrot root. Before 600 C.E., the Maya of Cerén, El Salvador, suspended ropes of onions and peppers and pots of food from ceilings and stacked bags of goods on rafters. Hawaiians recycled coconut shells into lard safes and tropical leaves into *poi* wrappers.

The Menominee chose bark buckets to protect maple sap or wild rice; the Chumash lined grass canisters with asphaltum to hold seabird eggs. The Carib of the West Indies built sheltered food storage near their homes and vented open-air drying, roasting, and smoking through the unthatched sides. A lean-to increased by 50 percent the floor space of the Mexican *jacal*, a one-room thatched mud hovel built by farmers and preferred by Tex a s *mestizos* and cowboys living at the edge of ranches. Likewise, the Iroquois loft and the underfloor of the Seminole *chickee* reduced the clutter of living space while shielding bagged perishables from rats and thieves.

Frontier Food Preservation

On the New World frontier, the add-on, meat closet, root cellar, saltbox, and indoor well house offered makeshift relief to crowded cabins and sod huts. In colonial York, Maine, the extra space of a lean-to or potato cache was a step saver that placed staples near the hearth. The nearness to a chimney assured the cook dry beans as well as sliced rounds of pumpkins and winter squash. Emulating the ramadas of Southwestern Indians, prairie farmers constructed brush arbors and slatted sheds on the south side as the need arose for storing firewood, dried meat, grain, and molasses. Among Quebec bakers, the one-or two-story lean-to sheltered a semi-indoor oven, which faced the outside and attached through the wall to the central chimney. Flues and roofing protected the dwelling from smoke and sparks by sequestering the shed from prevailing winds. Rising heat dried bean pods and grain sheaves to ward off mildew and kept canned salmon and sausage and rounds of hard cheese from freezing.

As meager bush cabins took shape on the Australian frontier, squatters chose survival over luxury. For a food safe, they suspended crates from trees. After outfitting their homes with a fireplace, bucket, shovel, and ax, some thrived enough to hammer together a crude cookout hut or kitchen lean-to. To these structures, they added bread tables, water filters, and meat safes, their bulwarks against ants, flies, and human and animal predators. For a similar purpose, in Scotland and the Hebrides, where fishermen and crofters relished dried and stewed seaweed as a vegetable or condiment and as forage for sheep, shelving required ample space. In storage sheds, they draped dulse and carrageen for drying.

Work Station and Storage

In Japan, the miso room once abutted the farm house kitchen. An unheated outer closet, it held fermenting pickles and soy products and flour in stoppered bamboo cylinders. Householders stored homemade condiments, blended from soybeans, barley, rice yeast, and salt for flavoring soup. Flat-bottomed wood barrels held rice yeast, a slurry of wheat, soy sauce, soybeans, and salt that gradually seeped into a bamboo filtration cylinder for ladling into noodle broth or stew. Lidded baskets secured dried sardines and shiitake mushrooms. In conical baskets, house wives mounded tofu, a curd formed of cooked soybeans and bittern extracted from sea salt. The typical Kyushu house wife, aided by a daughter-in-law, did the cooking in a dirt-floored lean-to at a stove situated on the outside wall for maximum protection of stored goods from fire.

The Agta of the Philippines constructed pantry sheds from wood and branches. Women sat together under the shade to pound corn between stones and secure it in bags. Similarly, near Rara Lake in Chhapru, Nepal, people in multifamily residences flailed barley and winnowed it from baskets before storing it in rooftop lean-tos. Malaysian families typically built a house, then nailed up an auxiliary cooking space. Their needs tended toward Asian simplicity—slatted baskets for storing rice, a mortar and pestle for grinding dried spices, and a wok and stirring paddle for cooking meat and vegetables.

In the 1980s, industrialized nations, strapped for fossil fuels, added lean-to

green houses, hoop houses, solaria, and sunrooms to their homes. Part of the impetus came from tax breaks on passive solar energy. In addition to storing warmth in stone and concrete floors, frame buildings, made of tempered glass and extruded aluminum, heated space for cultivating and drying herbs and growing a year-round supply of salad greens. In Ireland and Scandinavia, where the growing season is limited, green house advocates readied seedlings for the spring kitchen garden.

See also: Amerindian Diet; Bamboo; Caching; Cooking Schools; Famine; Middens; Olives and Olive Oil; Pemmican; Seaweed; Vinegar; Yeast.

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Street Food

Convenience meals and portable snacks sold on the street have a long and colorful history. From the 500s B.C.E., the agora of Athens teemed with sellers of nuts, sweets, lentil soup, cheese pies, *koulouri* (sesame buns), and wheat and barley cakes, especially during holidays and after theatrical performances. In Rome and Pompeii, vendors sweetened scoops of snow with grape must and honey. As an enticement to dock workers and soldiers, vintners accompanied wine carafes with dishes of olives and toasted chickpeas.

In the Middle Ages, a grassroots food culture appealed to crowds at fairs, bazaars, and agricultural markets. The circulation of coins simplified impulse purchases of drinks and tidbits, such as charcoal-grilled fish, roasted chestnuts,

and semolina snacks in Constantinople and Smyrna. In 1100, Japanese peddlers hawked quail eggs to passersby. Easily accessible Korean food stands displayed squid and octopus for consuming with rice cakes, a boon to the poor who had no kitchens.

Between 1096 and 1204, crusaders to the Holy Land purchased honeyed pastries and soup from food stalls and bought pocket snacks of almonds, apples, chickpeas, melons, pistachios, and walnuts from portable kiosks. At Cairo in 1326, Muslim travel writer Ibn Battuta observed drink and snack sellers doing business with Iraqi and Syrian refugees along the Nile. Ready-to-eat fare across the Middle East ranged from hearty grilled eggplant and sardines to child-pleasing snacks of almond cookies rolled in sesame seeds.

During the Renaissance, convenience food sold well as travelers and shoppers lined up to buy calzone in Naples, pomegranate seeds in Malta, and honey-nut morsels in Marrakech. In bazaars, purchasers watched street cooks roast meat and baste it with vinegar sauce. On Christian holidays, Europeans selected from scones and *gaufres* (waffles) marked with religious symbols. In India in the 1500s, enterprising cooks shaped fermented dal and rice into *dosas* (crepes) and offered coriander or tamarind chutney as condiments.

A thorough survey of New World street commerce reached Europe after 1519. Spanish conquerors of Montezuma II perused the food court of Tlatelolco, where Aztec shoppers bought seafood empanadas, corn on the cob, corn bread, bird and fish paté, and eggs as well as cashews and peanuts. Historian Bernardino de Sahagún reported the popularity of tortillas filled with ants, fish, *huitlacoche* (corn fungus), locusts, maguey worms, and snails. Buyers topped the main filling with raw vegetables and hot pepper sauces, a Mesoamerican innovation.

Curbside cuisine took advantage of place, time, and milieu. After 1550, Portuguese voyagers to Benin, Gambia, and Ghana found local vendors organizing food stalls along the coast. In Ethiopia in 1627, travelers could escape desert heat with melon slices and fruit ades sweetened with sugar. New Yorkers began patronizing pushcart food in 1691, when Italian immigrants sold marinated olives and Jewish cooks hawked knishes and dill pickles. In Jamaica after 1728, aloo balls of cumin-flavored mashed potatoes emerged from deep fryers for eating hot. In the 1800s, Hong Kong street chefs deep-fried *char siu* (barbecue pork) turnovers, ling balls, skewered meatballs, and vegetarian spring rolls.

Laborers and stevedores in Victorian England took advantage of penny pies and sheep's trotters, which purchasers consumed standing up.

The turmoil of war advanced the need for unorthodox food service. During the American Civil War, soldiers bought liquor and luxury items from mobile sutlers (civilian merchants). Noncombatants emptied home pantries to set up canteens at railroad stations to feed incoming wounded and their military attendants. From 1861 to 1865, black marketers and profiteers answered the demand for cheap meals. Food preparers overcame devalued currency and shortages by clever budgeting and eking out supplies with war time recipes, such as vinegar pie and ersatz coffee.

Agritourism established itself in the late 1800s as an appeal to gourmands interested in exotic and regional dishes, including Thai papaya salad in Bangkok; barbecued iguana in Baja, Mexico; and the stuffed pancakes of Xian, China. At the Philadelphia Centennial International Exhibition of 1876, fairgoers sipped ice cream treats from an arctic soda fountain. Neighborhood vendors on bicycles or pushing carts profited from foot traffic at train stations and hotels. At the 1893 Columbian Exposition in Chicago, innovative food dealers marketed chili from stalls and hot dogs from self-contained barrows and wienie vans.

The street venue prospered in large cities at sports arenas, landmarks, beaches, and public parks. Typically staffed by individuals or families, the outdoor food business offered financial security during hard times, especially for children, women, immigrants, and the underemployed. In the 1920s, entrepreneurs developed corn dogs, a wiener on a stick that succeeded in Argentina, Australia, Canada, New Zealand, and Vietnam. Chinese shoppers bought tofu curds simmered in soy sauce as a midday meal. The taste and smell introduced outsiders to a cultural staple as authentic and diverse as Hopi fry bread, and the aromas of hot dishes drew buyers to such specialties as the cassava chips of Mozambique, Barbadian pineapple slices, Thai steamed fish, and Peruvian coconut desserts. Sumatran vendors brushed turmeric sauce on *satay padang* (beef kebabs), a favorite with on-the-run eaters. Turkish meat sellers sliced doner kebabs from rotating vertical spits and sold side dishes of eggplant, peppers, pilaf, and tomatoes folded into flatbread.

In Africa and Asia in the twenty-first century, up to 50 percent of urban snacks consist of street purchases of oil-cooked peanuts and yams. In urban areas,

mobile dim sum and dumpling bars, pita sandwich and gyro carts, and falafel and taco stands provide 40 percent of the nourishment consumed by the homeless and low-income patrons. In Tanzania, schoolchildren buy fried bananas and cassava at midmorning break. The Food and Agricultural Organization of the United Nations monitors the role of quick snacks on the diets of children and the underclass. The World Health Organization sets sanitation and safety standards to reduce the merchandizing of unclean or toxic ingredients.

See also: Chili; Curry; Fast Food; Finger Food; Grilling; Insects; Kebabs; Tortillas; Wine.

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Sugar and Sweeteners

The incorporation of sugar and sweeteners in food increases its palatability and satisfaction to human taste buds. In New Guinea, Malaysians domesticated sugarcane around 8000 B.C.E. and passed the plant to traders from northern India. The Sanskrit language identified the white crystals as *sharkara* (grains or gravels), a reference to the crystalline structure of dried juice, which snackers could suck from the chewed cane. Indian ambassadors ferried gifts of sugar to Chinese emperors and touted its value as an aphrodisiac.

The sweet cane impressed Darius the Great of Persia, who invaded India in 510 B.C.E. and studied the growing of sugarcane along the Indus River east of Pakistan. According to field reports by the Macedonian admiral Nearchus, head of the Indus River fleet, Alexander the Great made a similar observation of the Indus

Valley in 327 B.C.E., when he chewed sweet cane. On Alexander's march west, he introduced Greece to imported jaggery, a crude form of sugar.

Around 70 C.E., Greek pharmacist Dioscorides, a specialist in the curative nature of honey, recognized sugar as a tonic for the alimentary canal and renal system. According to the Roman historian Arrian, the sugar trade thrived along the Red Sea by 95 C.E. Around 300, India competed with the Persians by extracting cane juice from the chaff and boiling the sap into a sweet syrup. After 606, the Chinese adopted sugarcane as a money crop and studied India's crystallizing technology.

Muslim expansion in 641 revealed the Persian source of cane and the milling of granular sugar. From the Fertile Crescent, Arabs and Berbers spread sugarcane cultivation and refinement west to Egypt, Sicily, Morocco, and Iberia. In the 800s, Sicilian brokers exported powdered sugar throughout the region. By the mid-tenth century, additional sugarcane fields produced moneymaking crops in Afghanistan, Cyprus, and Zanzibar and along the Caspian Sea. Venetian planters bought Lebanese plantations in Tyre operated by slaves from the Black Sea and dispersed bulk sugar from ware houses into central Europe.

European Sugar Mania

After 1000, Arab entrepreneurs invested in sugar factories in Crete and transported sacked goods by caravan. After 1096, crusaders to the Holy Land chewed cane for its flavor. Letters home reported on the wonder of the sweet juice, which soldiers categorized as a luxury spice. By 1099, supplies arrived in England, encouraging trading voyages to Asia. Apothecaries dispensed sugar at exorbitant prices. In France, sugar duties in 1153 raised tariff income in Marseilles and Narbonne.

During the reign of William II in Palermo, Sicily, in the mid-1170s, Theobald, the head of the Benedictine Abbey of Monreale invested in sugar milling, which became a foundation of marzipan, a popular money raiser. Similarly, in 1191, the Knights Hospitallers of Saranda Kolones Castle in Paphos, Cyprus, milled cane in the basement as a source of tax-free revenue from buyers at Acre, Israel. After Richard I the Lionheart outmaneuvered the Muslim general Saladin in September

1192, Richard claimed among his spoils spices and sugar, which he ranked with precious metals.

The fourteenth century saw standardization in the eastern Mediterranean sugar market and new plantations in Andalusia and Portugal. Factors in Egypt, Cyprus, Jordan, and Syria identified their wares under the headings of basket, block, cone, fine granule, loaf, raw, rock, rose, and violet sugar. Within the 1300s, sugar appeared to outdistance honey as a sweetener in recipes, an ingredient in medicines, and a source of confections, candied citrus peel, molasses, and Iranian rum. Improved technology increased cane yield from heavier presses, thus elevating the profitability in sugar.

In the 1400s, Venetians established refineries to reduce transport costs of raw sugar and competed with government-subsidized Sicilian operations and Iberian enterprises funded by Flemish and Genoan bankers. In 1493, Christopher Columbus thought so highly of sugarcane that he transported the pricey commodity to Santo Domingo on his second voyage. His foresight began a monocrop industry that thrived in the humid climate. Portuguese colonists transplanted his agricultural plan to Brazil, where planters imported slaves to oversee sugarcane fields.

The cuisine of the 1500s advanced sugar from a spice to a prime ingredient for baked goods, meat marinades, and fruit ades. Growers increased the trade in slaves from Africa, who labored as sugarcane cultivators and harvesters in Cuba, Surinam, Barbados, Guadeloupe, and Jamaica. The Dutch East India Company joined the sugar trade in Java in 1615. Demand for workers grew as the toll on slaves from burns and fevers reduced labor forces, cutting British imports of 4 million slaves by 90 percent to 400,000 by 1838.

Tudor England imported the best sugar from Madeira, Morocco, Cape Verde, and the Canary Islands and added it to sack (dry wine). Diners indulged so heavily in sweet desserts, preserved pears, and hypocras (spiced wine) that high consumption rotted their teeth. Into the sixteenth century, pirates listed stores of sugar as valuable swag. New plantations in the tropical Americas competed with monopolies over Sicilian and Venetian trade routes. To boost profits, British and French entrepreneurs promoted stronger sugarcane cultivars for planting in eastern Asia and the Mediterranean. In the late 1700s, the craze for sweetened chocolate for candies and drinks increased demand for sugar.

Competitive Substitutes

In the mid-eighteenth century, British treasury agents exacted high taxes on sugar from the nation's 120 factories. Government officials pressed the British East India Company to augment plantations with more fields in Bengal. Counter to hopes for a steady source of British revenue, the refining of beets into a cheaper sweetener during the Napoleonic era placed the French in control of an emerging Continental industry.

In the late 1800s, watermills, steam engines, centrifuges, and the vacuum evaporator invented in 1843 by American engineer Norbert Rillieux boosted plantation profits. Technological upgrades reduced the loss of slaves to industrial accident, exhaustion, and disease. Market revenues tempted Pacific islanders in Australia, Fiji, Hawaii, and Mauritius to plant their own sugarcane fields tended by coolie labor. Because of increased competition, wholesale prices of sugar dipped enough to allow smallholders to invest in bakeries, confectionaries, and street food sales.

In 1957, the formulation of high-fructose corn syrup introduced a cane sucrose substitute for soft drinks and processed cereals and fruit preserves. The discovery of aspartame in 1965 at G.D. Searle & Company in Skokie, Illinois, offered a replacement for saccharin, a late-nineteenth-century sweetener that leaves a bitter aftertaste. With the abandonment of cyclamate sweeteners in the 1970s to prevent bladder cancer, the sugar substitute xylitol, a product of corn and hardwood, resulted from Finnish studies of its benefits to teeth, bones, and insulin levels and control of yeast infections.

In 1976, the British marketing of Splenda, a sucralose sweetener, raised questions about false advertisements that concealed the chlorination of sugar molecules. Industrial food processors rejected Splenda because of its inability to brown and caramelize in confections and baked goods. In 2008, the U.S. Food and Drug Administration approved stevia, an herbal derivative of sunflowers long consumed in Japan, Australia, Russia, Singapore, and South America.

See also: Dutch East India Company; Honey; Liebig, Justus von; Medieval Diet and Cuisine; Mozambique Company; Proust, Joseph-Louis; Seaweed; Soft Drinks and Juices; Theophrastus.

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Supermarkets

Self-service grocery emporia simplify shopping for food and household items by offering bar, bakery, deli, floral, pet, and pharmaceutical items along with cleaning, kitchen, and school supplies as well as beauty items, video rentals, cash machines, and gas stations. The supermarket concept deviated from the frontier trading post and the dry goods or general store, where clerks took orders at a counter. The clerk rather than the customer fetched and weighed the items, bagged the goods, and totaled the cost by hand.

Small stores contributed to their own downfall. They offered a limited variety of commodities, purchased without the advantage of a cooperative buying agency. The one-on-one nature of shopping reduced the number of selections that multiple customers could make at one time and the number of bundles that wagoners could deliver to homes. Low-volume sales on credit raised prices to cover the cost of labor and overhead.

In an effort to automate grocery buying on a cash-only basis, on September 6, 1916, grocery wholesaler Clarence Saunders developed the first true supermarket at 79 Jefferson Avenue, one block from the Mississippi River in Memphis, Tennessee. He deliberately piqued consumer interest with a whimsical rhymed name, Piggly Wiggly. His merchandising featured name-brand goods, the beginning of consumer identification of foods by industrial processor and media advertising claims. Clean, self-serve shelving presented the entire inventory and

individual prices at eye level for customer inspection.



The Great Atlantic & Pacific Tea Company (A&P) began in 1859 as a small retailer of tea and coffee in New York City. By the turn of the century, it emerged as America's first grocery chain, with nearly 200 stores. This one dates to about 1890. (*The Granger Collection, New York*)

Shoppers carried in-house peach baskets and advanced through a turnstile in one direction through a series of aisles. Weekly specials and candy racks developed the tension between shopping to save money and to satisfy the urge to buy on impulse. At the checkout stand in the front of the store, customers carried items to uniformed cashiers, who totaled them on a mechanical register. Within a decade, Saunders's patented concept of independent ownership and supply from 36 centralized ware houses spread to 2,660 stores in 22 states.

By the end of the 1920s, food emporia added fresh eggs, fish, fruit, meats, and vegetables in refrigerated cases to displays of dry goods—bottled ketchup, boxed crackers, canned pork and beans and soups, and jars of mayonnaise and pickled

vegetables. Large stores featured discount deals and parallel aisles arrayed by department. The addition of wheeled frames to shopping baskets encouraged browsers to buy more than they had intended.

An Idea Grows

By the turn of the twentieth century, meanwhile, the Great Atlantic and Pacific Tea Company (A&P), initiated in New York City by wholesalers George Gilman and George Huntington Hartford, had grown from a local distributor of prepackaged tea to a thriving chain of old-style groceries throughout the United States and Canada. In the succeeding decades, as the stores converted to self-serve shopping, merchandisers boosted enthusiasm by selling store brands—A&P fruit preserves and powdered milk, Ann Page canned beans and spaghetti, Eight O’Clock and Red Circle coffees, Jane Parker peanut butter and potato chips—and by issuing store premiums from S&H Green Stamps, redeemable in merchandise. A similar marketing style in Great Britain brought success to Sainsbury, a supermarket chain offering house brand bacon, baked beans, biscuits, and cereals.

From August 4, 1930, until his death on April 24, 1936, Irish American salesman Michael Joseph Cullen of Jamaica, Queens, operated King Kullen, an iconic supermarket competing with American Stores, Big Bear, Kroger, Ralph’s, and Safeway. Following the stock market crash of October 24, 1929, the rise of Cullen’s expansive grocery empire coincided with a severe lull in the sale of farm crops and a spike in unemployment and vacant ware houses and workshops. Recognizing the importance of the automobile to women’s household chores, Cullen began locating stores in low-rent districts and offering ample free parking and evening hours. To create one-stop shopping, he added automotive and home hardware products to the inventory. Admirers dubbed him the founder of the supermarket industry.

To appeal to the bargain hunter during the Great Depression, Cullen’s circulars and two-page newspaper advertisements guaranteed low prices by selling 300 items at wholesale price and 200 items at cost plus 5 percent. One popular example, Campbell’s tomato soup, cost 7¢ in most stores and 4¢ at King Kullen. The economic model improved the quality and variety of the American diet

while reducing food costs by 8 to 15 percent and pharmaceuticals by 10 percent. By 1932, Cullen's eight locations in the Bronx and Long Island sold \$6 million in groceries, as opposed to a neighborhood grocer's average sales of \$25,000.

Cullen, known as the "price crusher," bought quantities of commestibles at discount and sold at lower prices than small grocery stores could match. His competitors launched blimps to promote grocery specials. Lobbyists for the "little man" fought heavy discounting to supermarkets by backing the Robinson-Patman Act of 1936, called the "Anti-Chain-Store Act" for intervening in the sale of food from manufacturers directly to supermarket chains. The Miller-Tydings Retail Price Maintenance Act of 1937 echoed the Robinson-Patman Act, which halted the underselling of branded merchandise by legitimizing fixed retail prices. The U.S. Supreme Court negated state statutes that allowed price fixing as violations of the Sherman Antitrust Act of 1890. Nonetheless, President Franklin Delano Roosevelt supported Miller-Tydings in shielding small business through authorized price fixing.

The success of supermarkets paralleled the death of the mom-and-pop service market and the growth of agribusiness, especially the sale of produce with the longest shelf life. Chains targeted fiscally healthy communities rather than ethnic enclaves and ghettos. Preferred customer cards allowed computers to keep track of what age group in what neighborhood relied on specials and which buyers ventured into gourmet and table-ready foods, such as barbecued ribs and rotisserie chicken. Centralized purchasing and distribution succeeded at Target and Walmart superstores in the United States; Tesco in Great Britain as well as China, the Czech Republic, Ireland, Japan, Malaysia, Poland, South Korea, and Turkey; and Zellers, a subsidiary of the Hudson's Bay Company in Canada.

Hyperstores, which combined groceries with department stores, profited from satisfying the average customer rather than the gourmand seeking culinary adventures, such as imported game. By courting familiar edibles, supermarkets threatened the variety of regional cuisines. A backlash by Earth Fare, Fresh Market, New Seasons, and Trader Joe's established a niche for local and organic produce; Avanza, Marukai, and Viva offered ethnic goods for the minority shopper. Whole Foods, a chain established in Austin, Texas, in 1980, profited from acquiring natural foods stores with the appealing names of Bread of Life, Food for Thought, Fresh Fields, Nature's Heartland, Wellspring, and Wild Oats.

In England, Whole Foods introduced American concepts of pure, wholesome diet by purchasing seven Fresh & Wild stores.

See also: African Food Trade; Clipper Ships; Cooperatives, Food; Hudson's Bay Company; Industrial Food Processing; Markets and Marketing; Russian Diet and Cuisine.

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[Swedish East India Company](#)

From 1731 to 1813, a golden era of Nordic commerce, the Swedish East India Company (*Svenska Ostindiska Companie*, or *SOIC*) competed with the Dutch and English for trade in Bengalese silk and Chinese foodstuffs, drugs, porcelain dishes, spices, and tea.

Scots trader Colin Campbell negotiated with Swedish brokers Henrik König and Niclas Sahlgren on forming an import-export business directed by Swedish nobles. In the wake of the Ostend Company, which closed in March 1731, the SOIC received a 15-year charter to carry copper, iron, lumber, and silver for trade with Asian markets. Setting out from the city-fort of Göthenburg, on the Göta River, on 20-month ventures, the 25 East Indiamen made use of an ice-free port established by herring fishermen. The ships, all built in Stockholm Terra Nova

shipyard, bore about 100 armed crewmen to ward off pirates.

The SOIC initiated its customs-free business on June 14, 1731, from Japan south and west to the Cape of Good Hope. The SOIC charter limited competition with established trading centers and kept secret all transactions. Wholesalers vied for the goods at public auction in Göthenburg, returning a profit as high as 60 percent. Food sellers in Amsterdam, Antwerp, and Ghent, such as Johannes Josephus Moretus of Antwerp, specialized in Swedish teas, making Sweden one of northern Europe's largest tea suppliers.

On the maiden expedition of the *Friedericus Rex Sveciae* and the *Ulrika Eleanora*—named for King Frederick and Queen Ulrica, respectively—Campbell took the role of Sweden's first ambassador to the Chinese emperor. Captain Georg Herman von Trolle loaded a fresh cow, goats, and pigs to feed the crew and embarked on February 9, 1732. He avoided deaths from scurvy by distributing lemon juice and sauerkraut, both antiscorbutics. The ships reached Guangzhou (Canton) in September 1732 and made the first purchase from *hong* (security or duty) merchants of Chinese spices and 430,000 porcelain butter boxes, rice and sugar bowls, soup tureens, mustard pots, salt containers, ewers, dessert dishes, fishplates and strainers, and chocolate, coffee, and tea services. Delayed by a Dutch inspection at Batavia, the expeditioners reached port on August 27, 1733. Chests of cinnamon and ginger turned such a profit that investors reaped a 25 percent dividend. Swedish pietists feared that such riches tempted citizens away from staunch Christian values and introduced them to an exotic cuisine and luxury chinoiserie—silk, taffeta, satin, damask, mother of pearl, japanned tea canisters and toilette tables, and blue-and-white porcelain tea services—that weakened the appeal of Scandic foods and customs.

A renewed 15-year charter and an increase of vessels to 36 continued a steady commerce with Guangdong Province and Surat, India. Within two decades, the SOIC imported 30,488 tons (27,653 metric tons) of tea. In its 82-year history, shippers completed 132 voyages, lost five East Indiamen, and turned into sizable wealth for capitalists a variety of foods—Asian galangal, a basic flavoring of Indonesian and Vietnamese cuisine, along with pepper, rhubarb, rice, sago flour for baking and puddings, tea, cinnamon and ginger, and arak, an anise-flavored aperitif and ingredient in Swedish punch distilled from rice and sugarcane.

Because Scandinavia had not developed a taste for tea, smugglers peddled

contraband tea through the Channel Islands, thus avoiding heavy port duties and excise taxes. Despite threats of imprisonment and confiscation of ships, Swedish dealers extended profiteering by underselling English wholesalers of Bing, Bohea, Congou, Hyson, Hyson Skin, Pekoe, Singloe, and Souchong varieties. The illicit trade, one of the causes of the Seven Years' War, introduced lower-class English and Scots to a drink once limited to the British aristocracy.

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Swedish West India Company

An ambitious undertaking, the Swedish West India Company (*Svenska Västindiska Companiet*) made limited inroads on the Dutch and English domination of New World trade in corn, furs, liquor, and tobacco during the seventeenth century.

William Usselinx, creator of the Dutch West India Company, collaborated with King Gustav Adolph and Chancellor Axel Gustafsson Oxenstierna in 1624 to form a Swedish stock company. Despite interest from key investors, subscriptions lagged at first. The projected colonization of Brazil and Guinea stalled after the king's death in battle, at Lützen on November 6, 1632. During the reign of Queen Christina, in summer 1635, Peter Minuit proposed that the Swedes join the Dutch in settling the Delaware, New Jersey, and Pennsylvania area and in exporting goods to Iberian and Prussian ports. In 1637, Chancellor Oxenstierna, speaking for the 11-year-old queen, decided to colonize the Atlantic Coast of North America and equipped the first Swedish expedition with Minuit at its head.

In early November 1637, the first 20 settlers traveled from Göthenburg on the sloop *Fågel Grip* and the armed merchantman *Kalmar Nyckel*. The pair of ships

arrived on March 29, 1638, to Swede's Landing across the Delaware River from Dutch-controlled territory. Arrivals immediately distinguished themselves from more militant Europeans by launching friendly, honest talks with local Indians, whom the Swedes suspected of being cannibals. With acreage purchased from the Lenni Lenape and Susquehannock, the first pioneers of Nya Sverige (New Sweden) made their home at Fort Christina (Wilmington), on the west bank of Delaware Bay in north-central Delaware. In a climate much warmer and drier than that of Sweden, they intended to raise their own food, evaporate sea salt, refine whale oil, and trade beaver furs, liquor, lumber, and tobacco in European markets. At the time, tobacco seemed the most likely cash crop because it began selling well in Sweden as a medicine for inhalants, painkillers, and poultices and as a recreational smoke.

Corn vs. Tobacco

While Minit government ruled New Sweden, the colony reached a population of 600 with the addition of Dutch, Finn, and German volunteers. On February 7, 1640, the *Kalmar Nyckel* made its second voyage to the New World, arriving on April 17 with the provincial governor Peter Hollandare and a few cows and oxen. The Finns acclimated to the land by building pole wigwams, conical Lapp dwellings that they equipped with a central fire and cauldron suspended from a crossbar and adjustable wooden hook. Swedes preferred the log cabin and hearth cookery in the great room, which set a standard of New World dwellings. A third expedition in 1641 brought cloth, fishing net, grain, muskets, tools, and wine malt plus chickens, horses, and sheep. Finnish grain farmers planted a cash crop of tobacco and cultivated corn as the region's staple food.

Because the Finns and Swedes found New World agriculture more rigorous than they expected, they established trade with the Lenni Lenape for corn, fish, hops, and venison. The Indians were generous with chestnuts, grapes, peaches, plums, walnuts, and watermelons. They misunderstood why the Swedes considered apple orchards private property and why removing apples without permission constituted a crime. According to the writings of Quaker philosopher William Penn, the Indians, using a Unami form of pidgin English, taught settlers

how to beat dried corn and boil it in water to produce hominy. Native women demonstrated how to crush corn kernels in a hollow log mortar. By placing a flat stone on top of the corn and pounding with a stone pestle, they reduced labor and waste and produced an evenly crushed meal. Native cooks mixed the meal with water and shaped the dough into corn cakes for wrapping in shucks and baking in ashes. A kind of travel bread involved mixing cornmeal with tobacco juice, which boosted energy and quenched thirst.

In 1642, Swedish traders began supplying Indians with European axes, cloth, fish hooks, guns, kettles knives, and liquor in exchange for beaver pelts, corn, and wampum, a shell-based adornment that doubled as currency. To get through the winter, colonists shot deer and geese and wove baskets, graters, pepperboxes, and sieves as well as slippers from birch bark. For drinking at Christmas and for sale, the Swedes fermented various varieties of wild grapes into a blended wine. At hearthside cauldrons, they brewed a thick ale by boiling and steeping six measures of barley, seven of hops, and seven of water and adding fir cones, yeast, and honey before storing the brew in casks. They reserved their stock of French wine for the sick.

Indian Commerce

To meet the demand of spring and fall barter on the Schuylkill River, the Lenni Lenape moved closer to trading posts in 1643. In addition to subsistence gardens of beans, melons, pumpkins, and squash and stores of wild Indian potato, they increased their cultivation of corn from a subsistence staple for *samp* (porridge) and a source of beer to a barter crop. For marketing, they stored beans and corn in hemp bags in caves and underground caches and transported up to 225 bushels (7,930 liters) of corn in each log canoe. In lieu of minted currency, pelts and wampum served as media of exchange. The arrival in March 1644 of equipment for a sawmill and gristmill plus leather-topped wooden shoes, bricks, and barrels of brandy, flour, salt, and wine increased the settlement's self-sufficiency. Colonists also imported ginger, pepper, and vinegar as condiments to flavor their bland diet. At a low point in trade, trappers depleted the beaver, a fire destroyed a fort and store houses, and the Swedes imported fewer trade items. In 1645, the

Lenni Lenape pondered slaughtering their partners in commerce to rid the valley of Europeans.

The Swedes stepped up their cash income by depending entirely on Indian corn, increasing their investment in sheep and swine, and turning cornfields to tobacco cultivation. By 1647, traders exported 6.5 tons (5.9 metric tons) of tobacco from New Sweden, yet the colonists chose to stress agriculture over commerce. A Lutheran minister scolded them for putting more energy into stockpiling skins, building river vessels, clearing new fields, planting orchards, and brewing than into converting Indians to Christianity. Diligence proved beneficial to the colony. Three years later, after acquiring plow oxen from the Dutch, Swedish settlers raised for sale 100 barrels of barley, corn, and rye and added the Dutch and English to their trading partners.

Agrarian Diversity

In 1650, debt incurred during the Thirty Years' War plus competition with the Dutch and epidemics and hard times in North America wilted the fervor of New Sweden, which suffered from despair, illness, and limited diet. The population shrank to 100 as colonists deserted to Maryland. At the direction of Governor Johan Björnsson Printz, farmers lowered their ratio of tobacco to food crops to ease colonial famine. Because corn grew better than European grain, New Sweden invested heavily in corn cultivation, warehousing kernels for human consumption and cobs, husks, and stalks for livestock feed. The Lenni Lenape taught farmers how to plant corn among stumps and downed timber at the rate of six or seven seed grains to the hill. On August 31, 1655, the Dutch, led by Peter Stuyvesant, the director-general of New Netherland, directed cannon fire from seven ships at New Sweden's Fort Casimir (New Castle), which surrendered the next day. Nonetheless, the Swedish Crown sent another expedition in March 1656 to pursue lucrative trading partnerships with English, German, and Scotch-Irish settlers. With a spurt of Finnish immigration to New Sweden, the population rose to 1,000. The Dutch divided the land into two colonies, which remained under Dutch control until the English seized the area on September 8, 1664.

By 1693, exports of bread, flour, grain, and oil to neighboring islands

established the Swedish yeomen as minor players in the New World food trade. In the early 1700s, reports of Swedish-American cuisine noted a heavy noon meal of bacon or pork, wheat dumplings, and pudding flavored with butter or molasses. Balancing the day's intake, breakfast consisted of pop robbin pudding, an egg batter boiled in milk, and an evening meal of mush or hominy.

Recipe: Pop Robbin Pudding

For pop robbin (a milk porridge also called heifer's delight, Indian hasty pudding, or lumpy dick), heat 1 quart of milk with salt and 1 cup of maple syrup. Knead a stiff batter of 1 cup of wheat flour, 1/4 teaspoon of cream of tartar, 1/2 teaspoon of baking soda, and one egg. Drop an acorn-sized lump of the batter into the hot milk. When the "robbin" pops to the surface, it is done. Serve with butter and cinnamon. In New Sweden, this recipe was popular for a winter breakfast or afternoon treat and made good use of extra milk. The sweet, fat-free dumplings suited the needs of the sick, especially those suffering from dysentery.

The colonists of New Sweden maintained a reputation for intoxication from homemade cider, mead, metheglin (spiced mead), perry, and punch and from rum and liquor imported along with Madeira wine and confections. Swedish celebrations favored treats of wild game and chocolate sweetened with maple sugar, but no coffee or tea, a custom that had not flourished in Scandinavia. In the 1770s, the Swedish carbohydrate-rich diet increased in variety with additions of beans, cabbage, peas, potatoes, rye bread, and turnips.

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Swiddens

From Neolithic times to the present, the clearing of agricultural lands and pasturage created by slashing and burning scrub, brambles, and woodlands dates historically to farmland around the globe. Swiddening contributed directly to the rise of civilization. As prehistoric hunter-gatherers shifted from nomadism and a heavy wild game and meat diet to one based on domestic animals, dairying, small game and birds, and berry and grain cultivation, around 9000 B.C.E., they clear-cut wood for fuel and charcoal and left open areas for up to four weeks to dry out for a thorough labor-saving burning. By 5000 B.C.E., swidden agriculture dominated food production, especially in the tropics and subtropics, including Brazil, Cambodia, Colombia, Ecuador, Guatemala, Jordan, Laos, Lower Danube, Mexico, New Guinea, Panama, the Philippines, and Vietnam. The system dominated agriculture into the twentieth century, when commercial food production overtook subsistence farming in importance.

As a communal effort, swidden cultivators such as the Olmec and Maya and the slaves of the British Caribbean zigzagged over the ground and applied torches to underbrush and diseased vegetation. The effort cleared fire-fallow ground of galls, pests and insect eggs, weeds, roots, and stumps. Cultivation required only a dibble (digging stick) or hoe. The firing method, still in use by some 500 million people, saves on slave purchase and peonage, pesticides and fertilizer, and the expense of earth-clearing machinery and fossil fuels. Swiddens, set aflame before the rainy season, rids a patch of its competitive flora and fertilizes the loam with nitrate- and potassium-rich ash, which improves the uptake of calcium and magnesium.

In an age-old division of labor, men drill the soil with dibles, while women seed the holes and slide soil in place with bare feet. Children sometimes pile stones to one side for other uses. Seedlings, slips, and suckers from earlier swiddens at least two years old supply transplants of select species, such as coconut palms or paper mulberry, which farmers fertilize with night soil. Traps

stop rats and birds from destroying new food plants.

A controversial land-management concept, slash-and-burn techniques require the purchase of extra land for alternation of fallowing and cultivation. Swiddening contributes to deforestation and destabilization of the watershed from loss of root structures. Burning releases carbon into the atmosphere through smoke that chokes bee colonies and renders denuded soil susceptible to wind and water erosion, which savvy farmers combat by outlining the area with logs or a greenbelt of shrubs and trees. Overgrazing and poorly managed swiddens can clear too broad an area for cultivation of a single crop, such as corn, rice, sorghum, or sugarcane. Infringement on natural growth patterns compromises ecosystems and increases the danger of desertification, notably, the advancing Sahara of northern Africa. The rapid settlement of Acre and Rondonia, Brazil, deprives the region of its forest canopy and limits the number of game species for table use. Among the plants destroyed by early swiddens, grasses, artemisia, Alpine sorrel, seabuckthorn, and dwarf birch and willow disappeared, depriving early farmers of edible seeds for cereals, artemisia leaves for flavoring and brewing, birch berries and sorrel nuts to prevent scurvy, seabuckthorn for syrup, and willow leaves for fever-reducing teas.

Eastern Asia and Indonesia perpetuate the swidden system, especially in Cambodia, Laos, Malaysia, Thailand, and Vietnam. In the mid-1980s, northern Vietnamese followed a five-to-eight-year cycle that supported a two-crop system. During the fallow period, trees and shrubs enriched the soil, particularly nitrogen-fixing legumes, a soil enhancer also favored by the ancient Timucua of Florida. Acidity levels evened out, allowing for improvement of soil moisture, structure, and texture. Soil acquired earthworms and valuable fauna that nurtured grasslands. Seed production and insects attracted birds and mammals for hunting.

In the Philippines, the Hanunóo of southern Mindoro Island apply slash-and-burn methods to croplands for corn and rice and live adjacent to their fields to protect them from pillagers, both human and animal. In choosing forest canopy for removal, they log the largest species and leave edible ferns, bamboo, and fruit and nut trees and vines undisturbed by their bush knives. Among rice stands, the Hanunóo intercrop—beans, betel, corn, and sugarcane—and plant empty swiddens with high diversity—bananas, bitter melons, cannas, cassavas,

cucumber, eggplant, lemon grass, millet, papayas, peppers, squash, sweet potatoes, and wild yams. Cooks prepare the produce for courtship feasts and ritual spirit offerings to the dead. Over three-to five-year periods, farmers such as the Hanunóo allow swiddens to return to the wild and move on to uncleared land before reclaiming swiddens in a cycle of fallow followed by slash and burn.

See also: African Food Trade; Agriculture; Hunter-Gatherers; Las Casas, Bartolomé de; Manioc; Taro; Wild Food.

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[Symbolism, Food](#)

Food and drink, the sustainers of life, carry unique significance in world customs and rituals. Ethnography epitomizes hunger and thirst as cyclical urges, evidence of human frailty and the need for cooperation and social relationships. Commensality—the practice of eating together—brought people together around fire, a source of light, heat, and cooking. According to the theories of French ethnologist Claude Lévi-Strauss, initial technologies of boiling and roasting food earned reverence for combining the powers of fire and water to produce palatable dishes. Thus, cooking, eating, and worship shared ground in the human ethos.

Around 23,000 B.C.E., Stone Age civilizations in Anatolia, Mesopotamia, and the Western Hemisphere recognized the female breast and ample belly and thighs as

sources of human survival. In some societies, the voluptuous female body epitomized well-being, dignity, and potential. More than the birthing and feeding of a family, maternal nourishment, symbolized by goddess cults, shielded the clan and tribe from seasonal scarcities and famine through mystic intervention with natural disasters, particularly floods and droughts.

The control of ingredients established the uniqueness of the female as food provisioner for the household. A corollary damned the woman who poisoned comestibles or who worked magic spells and curses through inedibles, such as poisonous fish, herbs, berries, mushrooms, and reptiles. The perversion of womanly roles required the destruction of the witch/poisoner, an antidote to the threat of consuming toxic foods. Similarly upsetting to social order, the loss of a staple food—notably a declining herring or salmon run, persistent rust blight on wheat, or the destruction of the North American buffalo herd—required amended mythologies and economic and religious restructuring to legitimize a serious or permanent shift in diet.

Gendered food symbols set patterns of mythology and social interaction. In 8000 B.C.E. among the Cochise culture of Arizona and a millennium later among the Basketmakers of the Rio Grande, worshippers feminized the planet as the Earth Mother and deified pit cookery as the steaming of agave, tubers, fish, and game within a female heart. Mongolian nomads identified tea as a gesture of hospitality feminized with camel's or mare's milk. Persian cooks took a realistic approach to the New Year with string egg noodles, an emblem of vulnerability and unavoidable entanglements of both genders.

Meal consumption elicited contemplations of power and family stability. For Mediterranean meals, the triad of bread, olives, and wine represented a varied diet promoting fullness and health. To impart these virtues to the newborn, parents planted an olive tree, a tangible equivalent of the human lineage. When Xerxes led Persian forces against Athens in 480 B.C.E., he ordered a conflagration in the olive grove on the Acropolis, a contemptuous attack on the Greek goddesses Athena and Nike, deities governing military power and victory. His blasphemy against female deities and a staple crop contributed to the Greek perception of all things Persian as perverse and contrary to nature.

In peacetime, food symbolism promoted civilized behaviors. In Japan before 200 B.C.E., the fermentation of rice into sake (or saki) generated an icon of the joy

in sharing. At nuptials, couples sipped sake in oneness as a prophecy of the happy home. The filling and emptying of sake cups in holy processions and Shinto rituals served monks and priests as propitiatory gifts to the *kami* (nature gods). The rice drink stocked the court pantry as evidence of fealty to the imperial family. Between rounds, the emperor's guests ate abalone, chestnuts, squid, pickled apricots, and seaweed, proofs of nature's bounty. New Year's celebrants recalled food insecurity in past eras by serving *awabi* (mussels), an ancestral famine food.

Greek food symbolism embodied a parallel mark of the good life, as exhibited by cheesecake and roast lamb, a celebratory banquet meat honoring heroes. A bride baked flatbread to prove her wifely worth. Draped in marjoram, a badge of fulfillment, she encircled the hearth to embrace her feminine obligations to her husband. As signs of blessing on matrimony, the wedding party tossed dried figs and nuts, storable supplies that warded off shortages.

In harmony with Greek ideals, Roman priests blessed wedding food as a manifestation of harmony and marital felicity. Guests threw almonds and coins as palpable wishes for fertility and prosperity. At his threshold, the groom blessed his mate with a lighted torch and carafe of water, emblems of house wifely duties and the power of the female to both kindle flame and douse it with water. Significant to the husband's responsibilities, the blood sacrifice of meat and the presentation of prime tidbits at the household shrine echoed the masculine emphasis on maleness and reverence to Mars, Rome's patron god.

Judeo-Christian Images

Judeo-Christian iconography established the Torah as the basis for food analysis. Hebrews revered Adam and Eve, the progenitors of humankind, and their raw food diet as chaste beginnings. As signs of nonviolence and satiety in nature, their uncooked meals reflected simple expectations and unity with Jehovah in the Garden of Eden. Sin and corrupt living precipitated the flood and Noah's escape. His family became the first full-time carnivores, pioneers of a new beginning in a land where animals and humans assumed adversarial roles.

Jewish food lore reached a height of metaphor at Passover seders. Families

consumed dishes signifying their history as recorded in Exodus: matzoh (affliction), bitter herbs (slavery), fruit and nuts (labor in Egypt), eggs and lamb (sacrifice), and parsley (rebirth). With all dishes, diners drank wine, the anticipatory gift reserved for Elijah, the legendary prophet and defender of the faithful against the flesh-eating adherents of Baal. For the Jewish mourners' meal during shivah, family members ate bagels, eggs, and lentils, round foods equating with the life cycle.

For Christians, the sacrament of Holy Communion joins celebrants in a shared meal reminiscent of Christ's last act of earthly leadership of the 12 apostles. The Eucharist betokens finality before the martyrdom of Christ on a Roman cross. Medieval Italian bakers empowered communion loaves with religious talismans—crosses, stars, pentecostal flames, and the Chi-Rho (XP), an abbreviation of Jesus's deification as the Christos, the anointed savior. After the 40-day Lenten fast, the blessing of Easter eggs foretokened new life and the promise of heavenly rewards concealed in the shells.

In memory of Jesus's miracle in feeding 4,000 followers with five loaves and two fish, early Christians sanctified the Greek *ichthus* (fish). For Easter and Pentecost, French and Italian confectioners shaped marzipan and sweets with fins and tails. Classical vegetarianism lost its following as fish dinners reminded the devout that Jesus proclaimed his disciples "fishers of men." Extending the image, church designers called the heart of the sanctuary the *nave*, a Latin term for "boat" that recalls the lowly status of the fishermen who supported Jesus's ministry.

Medieval Food Culture

In the Middle Ages, families raised swine as an indication of a prosperous, well-fed household. For English holidays, preparers roasted a boar's head and browned the skin with a basting of broth, butter, and herbs. Significant of plenty, garnishes of rosemary, mustard, and a lemon in the pig's mouth also attested to a varied, satisfying diet. Bakers and confectioners illustrated salvation by inscribing cookies with *XP* and *IHS*, abbreviations of the Greek Christos and Iesus, and *INRI*, the Latin slogan "Jesus of Nazareth, King of the Jews."

The post-Columbian confrontation between American Indians and Europeans shattered beliefs on both sides about the significance of edibles. When Spanish conqueror Hernán de Cortés arrived at the court of Aztec Emperor Montezuma II in 1519, he discovered corn, a staff of life to the Mexica. Preparers of court meals shaped corn cakes into beasts and butterflies, reminders that the spirits of heroes eventually return to nature. Both the Aztec and Maya revered cacao beans as icons of godliness and earthly treasure, a prophetic assessment of Europe's response to chocolate.

During the mid-1500s, Catherine de' Medici, the teenage bride of Henry II, transformed French dining rituals with signs of elegance and savoir faire, elements of the role of food in determining social class and political power. She introduced the artichoke as a status vegetable and demonstrated table manners and the use of the fork, a delicate three-tined implement used by men and women. In 1564, her *laiteries* (dairies) at Fontainebleau and Saint-Maur outside Paris elevated rural virtues, patriotism, and the feminine essences of fecundity and maternity.

Later meetings of East with West advanced knowledge of global cuisines. On Captain James Cook's voyage to Tahiti aboard the *Endeavour* in 1769, he recognized breadfruit as a ceremonial totem for Pacific islanders. Because of its assurance of food security, the newcomers interpreted the breadfruit as a token of a pastoral Eden. Similarly representative, from the Carolinas to the Caribbean, the pineapple appeared as a table centerpiece and carved affirmation of New World hospitality.

As Europeans expanded their interaction with other cultures, they recognized ethnic foods as more than sustenance. The Mexican tortilla, Cree pemmican, Chinese mooncake, Acoma fry bread, Inuit seal meat, Hawaiian rice balls, and Ceylonese curry bespoke ancestral ties to Earth's abundance. Supernatural attachments to nature enabled cultures to place themselves in the scheme of things and to bless the nutriments that dispelled human impermanence. The roles of the fisherman, herder, farmer, marketer, butcher, and cook generated an understanding of personal productivity and its effect on the social and economic order.

In American sociologist David Riesman's survey of food consumption in *The Lonely Crowd* (1961), mealtime and social drinks establish for the individual a

place in an increasingly complex, fragmented milieu. As conventional conformity breaks down in metropolises with fast food, coffee breaks, and snacks, the isolation of the individual diminishes the comfort of table rituals and shared cooking and serving. Riesman and his followers recognized that to cling to shreds of ancestral food sharing, city dwellers tend to flee the urban diaspora and return home for Easter, Passover, Eid al-Fitr, Thanksgiving, Corn Festival, and Christmas. In the familiarity of baked ham, roast lamb, challah, pecan pie, *pulque*, or turkey and dressing, the loner renegotiates a lost consciousness of home and reclaims the assurance of belonging to a human family.

See also: Afterlife and Food; Bread; Feasting; Portuguese Diet and Cuisine; Russian Diet and Cuisine; Shellfish; Taboos, Food; Vegetarianism.

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Szechuan Diet and Cuisine

One of China's four great culinary traditions—a long with Cantonese, Shangdong (or Lu), and Jiangsu— Szechuan (Sichuan or Szechwan) cuisine marries the fresh and aromatic to the tangy and spicy. The style of cooking originated in China's south-central Szechuan province.

From the 2100s B.C.E., the region evolved a cuisine noted for hot pot working-class meals and for robust taste in dried, pickled, and salted dishes. Situated on the trade route to India, Nepal, and Tibet, Szechuan prospered in commerce that proceeded east down the Yangtze River, thus linking western, central, and eastern China. Abundant in crayfish, oxen, rice, sugarcane, sweet potatoes, and wheat, area farms produced anise, bamboo shoots, bitter melon, chili peppers, citrus fruit, grapes, leeks, peaches, and radishes, the variants that add flavor, scent, and texture to dry braising sea cucumbers and turtle, saucing green vegetable tips, and steaming duck with pickled cabbage.

Regional cooks ventured outside Chinese norms with the addition of prickly ash powder and greater quantities than normal of garlic and ginger. From sacrificial cookery came twice-cooked pork, an entrée originally prepared for the gods. By 420 C.E., the Szechuan diet had acquired permanent culinary techniques and lasting influence. With the local well salt from Zigong, around 620 C.E., a 50-volume recipe book captured regional specialties. In the late 1600s, the importation of hot peppers from South America added the fiery heat for which the province is famous.



The spicy hot pot is the signature dish of Szechuan cuisine and the focal point of a group meal. Diners cook bits of meat, seafood, or vegetables in a simmering broth spiced with hot pepper oil or chilies and flavor the morsels with dipping sauces. (*China Photos/Getty Images*)

Local dishes display the significance of the mountainous province and regional tastes. Szechuan cuisine balances the fish and seafood focus of Shanghai with the hearty beef entrées of the interior. Preparation offers variety from poaching or steaming with flour gravy to quick stir-frying, which generates more mouth appeal. Recipes impose mythic qualities from the legends that surround their provenance. A specialty, Kung Pao chicken, originated around 1865, preserves the name of a provincial governor. Central to the entrée, the deep-frying of cashews or peanuts precedes the addition of marinated chicken cubes flash-fried in sesame oil. The layered flavors derive from balsam, black vinegar, lemony peppercorns (prickly ash berries), and red chili pepper plus varying amounts of chopped carrot, celery, Chinese cabbage, okra, scallions, and water chestnuts.

In the diverse Szechuan province, vegetarians find alternatives to the ever-present pork and poultry in bean curds and peanuts, Chinese cabbage hearts, cold bean jelly, cucumbers in mustard dressing, fried sweet potato cakes, hot soybean milk, lettuce in sesame sauce, marbled eggs, and vegetable wontons. Mapo tofu, a hot main dish, became known for numbing the mouth with peppers. The recipe dates to a female chef, Mrs. Chen Liu, who operated a restaurant in Chengdu, the provincial capital, in 1870. To achieve the sweet-and-sour flavor, the cook parboils cubed tofu, then emboldens the bland meat substitute with sautéed minced ginger, douban paste (fermented and spiced broad beans), chili flakes, green onions, peppers, rice wine, and soy sauce. According to herbalists, the pungent combination relieves aching joints by making the body sweat.

Famine taught the Chinese to avoid waste. Street peddlers served a piquant lunch or zesty snack of rice dumplings, squid in broth, or dan dan mein, a fragrant noodle dish topped with pickled mustard greens, pea sprouts, pepper, pork, scallions, and vinegar. For the poor, since the 1930s, *fuqi feipian* has made use of beef offal and organ meats heavily spiced with peppercorns. Essential to both entrées are cooking temperatures, fresh ingredients, and the slicing style for lamb, lotus root, wasabi, and other fibrous staples. In May 1958, Joyce

[Recipe: Szechuan Grilled Sweet Potatoes](#)

Brush sweet potato rounds with sesame oil and sprinkle with sea salt. Grill

on both sides. Arrange in a casserole. Top with 3 tablespoons of brown sugar and 1 tablespoon of ground Szechuan peppercorns blended with 1/3 cup of melted butter. Bake at 400 degrees Fahrenheit for 25 minutes.

Chen, a restaurateur from Beijing, set exacting standards for the Szechuan menu she imported to four restaurants in Cambridge, Massachusetts. In 1977, the opening of Yang Chow in Los Angeles's Chinatown introduced California diners to slippery shrimp, a fried specialty in a cornstarch crust.

See also: Feasting; Hot Pots; New World Commodities; Silk Road; Tea.

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T

Taboos, Food

The banning of edibles from consumption derives from a variety of cultural, ethical, hygienic, and religious reasons. Taboos may be tacit agreements of animists, as with Irish Celts who banned the eating of sweets designated as “fairy food” and the exclusion of fish and waterfowl from the diet by the Apache, Navaho, and Zuni. Another class of proscriptions lists codified regulations and canonical writing— for example, forbidding the eating of cattle and dogs by Hindus and the drinking of tea and coffee by Mormons. From 8000 B.C.E., Jainism in India ruled out root vegetables as well as figs because of the number of life-bearing seeds contained in each one. Out of reverence for life, Jains preferred leafy vegetables for their simplicity. In Greece around 540 B.C.E., Pythagoras’s followers adhered to his abstinence from beans, which he believed contained elements of human souls.

The pagan logic of excluding foods from the diet also reflected locale, such as the reverence for the beaver among the Oconee Valley Indians of Georgia. People in temperate zones relished dairy products that tropical cultures banned, primarily because dairy animals failed to thrive where they could not pasture. Similarly, the eating of live insects in Central America resulted from the variety of edible species, which the Aztecs tucked into tacos. Groups with a European background were more likely to recoil from grub and locust consumption because their region lacked palatable insect species.

Jewish Dietary Laws

Israelite health ordinances in the priestly books of Deuteronomy (after 641 b.c.e.) and Leviticus (after 538 b.c.e.) codified *kashruth* from preexisting food prejudices. Scripture approved the consumption of only clean, unspotted edibles already

killed for the table. Dietary laws permitted ruminants, the animals that digested tough green fiber. Some *treif* (forbidden edibles) comprised a singular category, such as bats, camels, cats, catfish, crocodiles, eels, elephants, hares, horses, insects, reindeer, or swine. Additional considerations listed a distinct class—carrion-eating birds, such as buzzards and rooks; the blood of any mammals; or a species, specifically bonefish (herring and marlin), crustaceans, reptiles, and rodents. In current times, the pollution of clean food with proscribed emulsifiers, enzymes, gelatin, glycerin, or rennet also negates processed items from use.

The Hebraic revulsion of pork may have derived from the inability of swine to adapt to deforestation and desertification in the Middle East. Sociologists account for the loathing of pigs as a demonstration of enmity between sedentary farmers and pastoral Hebrews, whose nomadic lives were unsuited to tending swine. The distaste for pigs grew so virulent in Egypt that priests outlawed the approach of swineherds to temple grounds. Nineteenth-century interpretations substituted clinical logic for desert lore. The educated Jew acknowledged the danger from trichinosis, which flourished in pork. A host of internal pathogens thrived in blood; likewise, shellfish bore typhoid toxins, which early Jews identified only as fever. These scientific views on *treif* corroborated centuries of arbitrary injunctions.

Taboo Details

Less doctrinal considerations have determined individual cases, notably the social consumption of alcohol and salt by Methodists and Rastafarians and the slaughter of companionable dogs or horses as entrées in Scandinavia. In southern Asia from 2600 B.C.E., monastic house rules governed the diet of priests and temple servants, such as Brahmins and Buddhist priests, who ate no garlic, mushrooms, onions, or pepper. During the Christian meat fasts of Lent, the sacred period from Ash Wednesday to Holy Saturday established after 190 C.E., French monasteries allowed the eating of the *laurice* (unborn rabbit), which Pope Gregory I declared a fish. From 630 C.E., Muslims agreed to ban consumption of blood and to fast throughout daylight hours during Ramadan, the most sacred celebration. However, Islamic sects clashed over consumption of meat: Shia

forbade catfish, eel, rabbit, and shark from Muslim tables; Sunni allowed them. At present, Sinhalese Buddhists refuse to slaughter cattle, to prevent the waste of a useful animal that gives milk and pulls the plow and wagon.

Other regulations determined gendered situations, such as the fasting of Saulteaux girls of Canada during menarche and the eating of duck wings and avoidance of raw meat by Eskimo mothers during the first five postpartum days. The avoidance of papaya and mango by pregnant or lactating women in southern India for fear of spontaneous abortion coincided with rejection of saffron lest it turn the fetus's skin lighter. Chinese women feared crab claws, fish, and turtles, reputed to cause miscarriage. In Africa, rules governing daily meals denied eggs to young children and fish and green vegetables to some pregnant women. Separate dicta in Australia governed the diet of uninitiated Aboriginal boys, such as the proscription of totemic crows or hawks to Euahlayi youth of northwestern New South Wales.

Cultic taboos traditionally emerged from specific situations, such as the arbitrary ban on consumption of sacrificial foods from Israelite and Greek holy altars and the Iroquois taboo against eating a bear, eel, heron, sandpiper, turtle, or wolf, an animal that named a clan. A required reciprocity forced gift giving of yams to keep growers from consuming their own produce. Specifics governed limitations of foods to specific persons: the eating of animal testicles by Plains Indian warriors, the hunting of lizards for snacks by Papuan boys, Aztec rituals for devouring the palpitating heart of an enemy, and the consumption of an infant's placenta in Chinese Nu Bao (herbal) pharmacopoeia and Vietnamese midwifery.

Many regulations are class specific, such as the reservation of swan for English royalty only and of gorilla feet and hands for guests in the Congo. According to Hindu social dicta prescribed in the Dharma Sutra (after 200 C.E.), Brahmins could not eat food offered by the lower castes except in cases of illness or famine. According to religious laws, those who disobeyed returned in the next life as worms. In the early 1500s, the court of Montezuma II in Tenochtitlán declared chocolate so strong an aphrodisiac that no woman or priest could risk being inflamed by it. In the nineteenth-century southeastern United States, the eating of carp, opossums, pickled pig's feet, ramps, and shad occurred mostly among the isolated poor, whom urbanites ridiculed.

Historic Taboos

Individual tribal separations of food into the edible and the forbidden occurred among people for unique reasons, as with the seasonal separation of caribou and walrus meat among the Eskimo and the avoidance of fish by Cushites of Egypt, Eritrea, Ethiopia, Kenya, Somalia, and Tanzania. Among the Kikuyu of Kenya, men and women dined apart to restrict women from seeing men cook and eat meat. Among the nomadic Masai herders of East Africa, food service was labor and gender specific—virile hunters depended on blood, meat, and milk, the sources of manhood; women, children, and elderly men ate mostly vegetables. The Middle East, dominated by Islam, separated meat cookery into seafood, which the Koran allows, and the flesh of four-footers, which scripture condoned except for pork, an abomination to Muslims.

Currently, moral consumerism resolves issues apart from dogma—the esthetic worth of songbirds, the ethics of eating animal fetuses, and the sustainability of endangered Apache trout, blue whale, bonobo, Chinook salmon, crocodile, sea turtle, and whale shark meat. A moot category limits consumption of exotica—fertilized eggs, offal, road-kill, and snails, all repugnant in some societies but eaten as delicacies in others.

As a gesture to animal rights, ethicists promote the sale of free-range over caged poultry for both meat and eggs and of ocean fish caught by netters who avoid harm to dolphins. Situations allow the exemption of taboo or repulsive sustenance during famine or danger of starvation, when survivors accept decaying garbage, insects, cats and dogs, rodents, and even human flesh as food. Other considerations, as with the infection of beef with mad cow disease and the bush rat with monkeypox and leptospirosis, precipitate trade barriers against targeted animals.

See also: Alcoholic Beverages; Cannibalism; Customs, Food; Halal; Kosher Food; Paula Marín, Francisco de; Shellfish; Temperance.

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Taillevent (ca. 1310–1395)

A flexible, efficient Norman-French master of late medieval gastronomy, Taillevent produced a period overview of Capet and Valois food service with *Le Viandier (The Provisioner)*, ca. 1375), a sourcebook of medieval cuisine during the Hundred Years' War. Rising from potboy and fry-cook to master chef, Guillaume Tirel of Pont-Audemer, on Normandy's north shore, is the only medieval cook known by name and career. Later called Taillevent ("chop-wind" or "jibsail"), he apprenticed in turning spits and prepping vegetables in royal house holds.

From boyhood service in Paris to Queen Jeanne d'Évreux, wife of Charles IV, Taillevent advanced at age 26 to royal chef of Philip VI de Valois, who called his servant "our beloved cook." In 1347, the master cook moved on to south-central France to serve the Dauphin de Vien-nois for eight years as kitchen manager. His employment as provisioner coincided with staff shortages and a severe dearth in foodstuffs, following the Black Death of 1348 and the famine of 1351. By 1355, Taillevent's salary included wages of 15 livres plus a travel allowance and hay for his horses during the scouring of the countryside for royal groceries.

At his peak, Taillevent cooked for Charles V, a low-key monarch who maintained friendly relations with his staff. One of the cook's innovations, the introduction of cabbage recipes, upgraded a food usually relegated to peasants. He also proposed balancing cooking flavors by mingling vinegar with sweetened

wine. He abandoned spice for spicing's sake and recommended specific flavorings for specific tasks, such as reducing the smell of rot in a wine cask with the addition of ginger.

From chef to head chef and provisioner, Taillevent achieved the rank of sergeant at arms, an unusual appointment to knighthood, and directed a household security force. For quality service, the king awarded him 100 gold francs and a home in Paris called Larchière. In 1392, the cook's titles included *Maistre des Garnisons de Cuisine du Roi* (master caterer to the king). Still in service to the Valois household in his mid-80s, he continued to work for Charles VI as kitchen supervisor.

In Taillevent's recounting of cookery, France's earliest-known cookbook, the author cites the intricacies of beef bouillon and the use of bird giblets and boiled sauces. His refined tastes demanded saffron for coloring entrées and slow cookery on heated tiles. The cook revealed his experiences in day-to-day kitchen problems with advice on how to leach salt from cod and vegetable ragouts by steaming a cloth over the pot and how to remove the scorched taste of burned entrées with yeast. Taillevent's cooking vocabulary— plucking, dismembering, grinding, infusing, parboiling, fricasseeing, crisping, straining— displayed practical knowledge of hearthside techniques as well as a command of domestic and imported aromatics. An arbiter of taste to royalty and prelates, he de-emphasized spicing and allowed chief ingredients to unleash natural flavors, a philosophy that returned to favor in the 1970s with *nouvelle cuisine*.

The chef moved effortlessly from simple rabbit stew to the glazing of bitterns, calf tripe, mallards, rays, suckling pig, and turtledoves. His finishes—an incised fleur-de-lis, gold and silver leaf, pomegranate seeds, almonds fried in butter and set in a pattern, and a final dusting of powdered sugar— reflected an obsession with plating done right. For these skills, he achieved an annual salary of 55 livres, the equivalent of 55 pounds of silver.

In his 100-page handbook, the royal chef named briskly, but inexactly, the ingredients of each concoction. While he omitted measurements, he disclosed personal preferences, such as the sautéing of greens and tasty nibbles in bacon grease. His versatility in creating fresh or spiced eel dishes and bracing hot caudles for the sick indicated an intellectual curiosity into dietetics.

An anonymous addendum, *Du Fait de Cuisine (On Cookery, 1420)*, inserts

menus that explain the order of

[Recipe: Subtil Brouët d'Angleterre](#)

For a rich English broth, Taillevent described a labor-intensive preparation: “Peel and boil a quantity of chestnuts, and then pound them in a mortar with the yolks of hard-boiled eggs, and a piece of calf’s liver, moistening them from time to time with lukewarm water; pass through a hair sieve; flavour with pepper and saffron; then put in your broth and boil together.”

ser vice for meat and meatless days on the ecclesiastical calendar. Into the seventeenth century, Taillevent’s text remained a standard of food innovation. His nickname became a synonym for excellence.

See also: Cod; Cookbooks; Fish and Fishing; Grilling; Poultry; Salad and Salad Bars; Wine.

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[Taro](#)

A hardy native of Indo-Malaysia, taro (*Colocasia esculentum*) balances a meat diet with a vitamin-rich starch and provides growers with leaves, roots, and stems for a versatile famine food. Because of the tuber's lengthy shelf life and transportability at sea, it may be Earth's oldest edible crop. Evidence of taro in the Solomon Islands dates to 28,000 B.C.E., when Austronesian seafarers chopped the wild plant with stone tools. Tropical Asians began cultivating the tubers before 8000 B.C.E.

In 7000 B.C.E., Indonesian farmers managed taro fields by the swidden method, using calcified shells for weeding and cutting tools and burning fields clear of chaff. The peelings, returned to the roots, fertilized the next crop. In New Guinea, the cropping of bananas, coconuts, sago, taro, and yam provided a substantial and varied diet. Highlanders advanced taro fields at greater altitudes by burning forests and scraping out ditches with digging sticks. In the Ryukyu Islands, fishermen and traders eased into farming after discovering how to plant tubers.

The eastern Chinese grew tubers in irrigated paddies. Crop tenders developed an integrated diet of adzuki beans, rice, soy, and taro as accompaniments to chicken and the fish they netted from rivers and in taro turnovers, steamed cakes, and dessert soups. Although taro corms and leaves required soaking and cooking to counter the toxicity of calcium oxalate, it produced a digestible staple suitable to the feeding of infants and invalids. A diet enriched by fried and steamed taro launched a population explosion.

Global Foodstuff

From India, Malaya, and New Zealand, taro migrated to Madagascar and Kenya under the name *cocoyam*. Cooks served breadfruit and taro with roasted doves. In West Africa, growers called taro greens "callaloo," which they prepared with okra, pepper, tomatoes, and shrimp. The recipe followed slaves to the Caribbean. Subsequent migrations introduced into standard English the Polynesian terms *taro* and *poi*, a nutritious fermented paste or cream of baked taro corms.

Serious drought in 4000 B.C.E. forced sub-Saharan natives into the tropical lakes and rivers of southern Mali. Seminomadic growers domesticated taro and

yams to eat with the meat of gazelles and oryx. From market contacts, in 2000 B.C.E., the African taro passed to the Fertile Crescent of western Asia and west into the Levant.

After 400 B.C.E., Japanese growers planted taro tubers in paddies as a pantry staple. The vegetable anchored the diet until the cultivation of rice. On Cyprus and Icaria in Roman times, cooks simmered taro with celery and coriander and seasoned the stew with lemon juice. In Roman kitchens, cooks stocked the roots that shippers imported from Egypt. Recipes by Apicius in *De Re Coquinaria* (*On Cookery*, ca. 35 C.E.) suggested ways of complementing meat and tangy sauce with bland boiled taro, a forerunner of the Peruvian potato in European gastronomy.

After 1000 C.E., taro cultivation supported population surges and intensified farming. On New Year's morning, Japanese cooks presented red rice with taro soup, which they prepared the previous night to prevent cooking on a holiday. An unusual bridal menu on May 12, 1192, for King Richard I the Lionheart of England and Queen Berengaria of Navarre introduced guests at Limas-sol, Cyprus, to platters of hash meat and taro.

In Hawaii, some 300 varieties of taro bore the ritual respect of the men who prepared it for human food and pig fodder and the women who baked it in *imus* (earth ovens). At the royal estate at Nuuanu Valley, King Kamehameha III hosted the largest luau on July 31, 1847, when 10,000 guests ate fish, pork, and taro, which preparers wrapped in ti leaves and steamed over hot rocks. Royal cooks rounded out the banquet with *kulolo*, a baked taro pudding sweetened with grated coconut. On June 11, 1871, a royal decree honored the king's deceased grandfather, Kamehameha I, with a traditional banquet featuring taro grated into poi as a side dish for roast pork and fish wrapped in taro leaves. Despite the place of taro in national dishes, nutritional standards gradually declined as imported bread, rice, tea, and tinned meat replaced fresh fish and taro.

Modern Uses

In the twentieth century, Samoan chefs enlivened breadfruit and taro recipes with brown sugar or curry, a luxury spice from India. Cooks built feasts around

boiled taro or rice steamed in coconut milk. Dishes of breadfruit, crayfish, green bananas and papayas, seaweed, and taro leaves in coconut cream complemented the starchy entrée. Between China and India, the Bhutanese supplemented grain harvests with avocado, bamboo shoots, and taro. Filipinos grew taro to stew with pork or shrimp or to mix with jackfruit and sago for dessert. Egyptians flavored soup with cooked taro leaves and added them to lamb stew.

The popularity of poi in the 1980s resulted from a low-fat regimen, the Waianae diet, a source of energy and stamina from traditional Hawaiian foods. To a bland entrée, Hawaiian chefs added poultry and seafood and side dishes of arrowroot, bananas, berries, fern, pickled seaweed, sea salt, and yams. Reports that taro prevented cancer increased its value, as did the use of taro flour in diabetic cookery, gluten-free baking, and vegan diets. Monopolies grabbed Hawaiian taro and other unusual commodities for hoarding and profit. In aquaponic plantations, taro greens thrived in a flowing water garden.

Currently, New Guineans grow some 600 taro culti-vars but prefer the red tuber for its buttery taste. Indian and Nepalese chefs serve taro in pancakes and as complements to dal to piquant condiments— curry, green chili chutney, mustard, pickles, and tamarind. Lebanese diners prefer taro with tahini; Maldivians fry the roots into chips. Cook Islanders prepare taro greens (also called dasheen or eddo) in coconut milk and serve it with chicken, octopus, parrotfish, and suckling pig. Hotels in the Pacific as well as Disneyland and Sea World emulate the Polynesian feast by plating slices of roast pig with poi and taro chips. In the Azores and China, chefs add sugar to pureed taro for dumplings, ice cream, and pie filling.

Because it lacks the nutrients of corn, rice, potatoes, and wheat, taro can only supplement meals, such as the taro greens added to Vietnamese pumpkin in coconut milk or sweet-and-sour fish soup. Traditional Hawaiian cuisine features poi made from the “royal” pink-fleshed tubers and forced through a ricer to add to bread, muffins, pancakes, and pudding. Some prefer it naturally soured by lactic acid and yeast. Island healers maintain that taro contributes to wellness by warding off fevers and malaria. Because of its digestibility, poi nourishes endangered infants. It also strengthens athletes by boosting the immune system to reduce inflammation.

See also: African Food Trade; Curry; Hot Pots; Luau; Polynesian Diet and Cuisine; Wild Food.

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Tea

The world's most popular brewed beverage, tea (*Camellia sinensis*) anchors daily food consumption and official and social events. As a drink and as a medicine and vegetable, it derives from a wild evergreen that flourishes in tropical and sub-tropical highlands of Burma, China, India, Java, Laos, Sri Lanka, Thailand, Tibet, and Vietnam. Whether hot or cold, tea's most intense flavor comes from tiny shoots, which crown the bush during the growing season. The distinctive oolong, or red tea, from Fujian, China, acquires stronger bouquet, color, and sweetness from the end leaves plus the next four on the stem.

Interplanted with jasmine and mallow, the tea plant absorbs surrounding aromas, which contribute to refreshing, transcendental qualities. Packagers blend black, green, oolong, and white teas to ensure first-crop quality and to protect invigorating caffeine and tannins. Refiners augment flavor and scent with additions of bergamot orange rind, caramel, cardamom, honey, lemon, lotus, ma-sala, mint, and vanilla. Because of its mellow taste and gentle stimulation of the body, *tea* has become one of the most common terms in world languages.

Early History

Early History

Tea drinking began in China before 2700 B.C.E. with the chance discovery of stimulating flavor by the mythic Emperor Shennong, an amateur herbalist. Around 700 B.C.E., practitioners of Taoism honored a gracious tea ritual for invigorating the mind and spirit. The charred bud tips, first embraced as an imperial plea sure, gained popularity around 200 C.E. in China as an exhilarating tonic. By the early 600s, tea advanced to Japan and Korea as a relaxing drink and ritual offering during ancestor worship.

Sichuan tea reached Tibet in 641 after the union of a Chinese princess with Tibetan King Songtsan Gambo. Supplied with low-grade “border tea” over the Tea Horse Routes, Himalayan tribes traditionally churned their refreshment with rock salt and rancid yak butter, which foamed to the top. *Tsamba*, the staple travel food of Tibetan nomads, began with popping barley like popcorn and forming a dough with butter-tea to the consistency of oatmeal. Tea, tsamba, and yogurt produced a satisfying meal for family and guests. The thrifty Tibetans reserved the tea leaves for feeding horses.

Chinese merchants distributed leaves in brick form for grinding and boiling in clay kettles or in rolls of darkened *pu'er* tea wrapped in bamboo husks. Traders bore packages from Yunnan Province along southwestern borders and, as early as 750, introduced tea drinking in northern India. In the 900s, Moorish travelers carried the tea custom to Islamic nations. Beginning in 960 during the Song dynasty, Chinese beverages made from compressed tea cakes encouraged catering services, exotic food clubs, restaurants, social clubs, and tea houses. In repose, refined guests heard poetry recitations and storytelling and negotiated business deals while nibbling finger food, such as quail eggs and bean curd rolls.

Trade and Commerce

Around 1250, Chinese food processors altered traditional steam-treating methods by roasting loose tea leaves for brewing rather than boiling. As a commodity, bags of the loose tea traveled along the Silk Road to Arabia and North Africa. In the 1500s, widening sea routes introduced mariners to the tea of Macau. In 1610, the first boatload of tea impressed elite Dutch visitors to the Hague, where they

tinged each cupful with milk.

Over the next half century, tea gained a reputation for curing headaches, preventing consumption, and relieving fatigue. Traders carried the commodity to Germany and, in 1670, to colonists in Massachusetts and New York. Quakers promoted enthusiastic tea consumption in Philadelphia. To the north, black tea arrived in Russia in the late 1600s, when courtiers and aristocrats blended it with vodka and wholeheartedly adopted it as a national beverage. To the south, Persians received tea from the Tartars and extolled it as a tavern drink for maintaining stamina.

In London in 1657, restaurateur Thomas Garraway touted tea to his coffee house customers as a treatment for anemia, dropsy, and scurvy. The beverage gained fame in 1662 as the favorite of Queen Catherine of Braganza, the Portuguese wife of Charles II. British drinkers developed a taste for tea with milk, which produced a creamier, less astringent beverage.

The British Crown recognized the tea fad as a source of steady income, and by 1684, authorities imposed a duty that boosted the price by 500 percent. Thomas Twining, distributor of Earl Grey tea, opened London's first tearoom in 1706, where customers sipped steaming drinks while reading newspapers and conversing with fellow tea fans. Eastern Europeans developed their own tea culture from Lapsang souchong, a tea dried in bamboo baskets over pinewood fires. The strong, smoky leaves traveled by camel caravan on a 6,000-mile (9,600-kilometer) route through Russia, raising prices for supplies of chai tea.

Varieties

The 1800s brought demand for distinctive varieties, such as the aged leaf steamed in Korean court ceremonies in the late Joseon dynasty and the iced black tea consumed in the American South. In Hong Kong, diners took Chinese congou or souchong tea with dim sum, a variety of snack buns, dumplings, steamed rolls, and tarts. After Europeans began trading with the Maghreb (northwestern Africa), Moroccans imported Chinese green tea, which hosts steeped with sugar into a syrup and served with ambergris, citron, lemon verbena, mint, pine nuts, and wormwood.

After 1840, tea drinking by British colonials and soldiers in Bengal and Nepal energized demand for dar-jeeling, a light, floral drink made from indigenous bush leaves. Ceylon tea, first shipped to England in 1873, competed with coffee as a major import. Scots entrepreneur Thomas Lipton bought up Ceylonese coffee plantations and replanted them in tea for dispensing in sealed packets. A specialty estate tea, limited to high-quality black Keemun leaves from Anhui, China, and sold by Twin-ings, came from the royal blend made for Prince Edward of Wales. The smoky, plum-scented drink contributed to the merchandising of English Breakfast Tea, a favorite of Edward's mother, Queen Victoria, during her residency at Balmoral Castle, Scotland.

In the 1920s, after the collapse of the Ottoman Empire, coffee became too expensive in postwar Turkey. Rize tea from the Black Sea coast received the blessing of President Mustafa Kemal Atatürk as a replacement beverage grown on Turkish soil. Served full-strength in glasses with beet sugar, the rich red liquid came to table in bazaars and homes with a separate pot of hot water for diluting to individual taste.

Leaves, Bags, Bottles, and Cans

Following World War II, tea sales shifted to suit convenience in snacks and meals. In 1953, Tetley, a major tea distributor in India, began bagging and selling leaves in one-cup servings throughout Britain. Tea experts charged bag makers with cloaking substandard crumbled leaves and tea dust rather than whole leaves and with limiting the action of hot water in extracting savory oils. The discovery that the epichlorohydrin paper coating caused cancer further discredited bag tea.



A plantation worker picks tea leaves in India's northeastern Assam state, which accounts for more than 70 percent of the nation's tea industry. Long the world's top producer, India now ranks second to China. Fine-leaf tea is still hand-plucked. (*Anupam Nath/Associated Press*)

Connoisseurs heaped more scorn on instant tea, popularized in the 1950s, for overpowering delicate flavor with additions of fruit, honey, powdered milk, and vanilla. The least favored product, bottled and canned tea, first distributed in Japan in 1985, offered a wan version of fresh tea sparkle. Fans chose it as an alternative to soft drinks and in response to claims of health benefits. Aficionados turned to traditional pu'er tea for lowering bacteria count and cholesterol, and promoted oolong, a variety reputed to aid in weight loss, reduce blood pressure and tooth decay, relieve stress, and lengthen life.

See also: Art, Food in; Clipper Ships; Herbs; Silk Road; Swedish East India Company; Tea Ceremony; Trading Vessels; Wild Food.

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Tea Ceremony

A dynamic emblem of cultural identity, the traditional Japanese tea ceremony expresses community and belonging through a simple, powerful taking of refreshment. The *chado* or *sado* (way of tea) ritual had its roots in Zen Buddhism as a religious or medicinal drinking of *matcha*, a bitter green tea. The aesthetic evolved from an appreciation of beauty and order in cyclical mundane events, and the elements of the ritual mimic the physics of the universe: wood into charcoal, charcoal set afire, fire heating metal, and metal causing water to boil.

In keeping with Buddhism, the ritual celebrates the sacred within. For this reason, participants need no religious icons or statuary. Each experience produces its own mood and positive outcomes, from sober to peaceful or glowing with hospitality and camaraderie. As a result of practitioners' enthusiasm for formal tea drinking, the ceremony has fundamentally influenced the Japanese ethos—its religion, clothing, etiquette, architecture, art, gardening, calligraphy, and philosophy. As a unifier of society, the ceremony has perpetuated citizenship and ideal behavior.

Order and Discipline

Motivation for the ceremony grew out of the high value placed on a rare and

expensive commodity. Rigidly programmed, often after a light meal, the ritual welcomes honored guests to a microcosm of order— a ceremonial room, tea house, or rustic shed in a garden. Each space features a raised platform in a rectangle no larger than 9 square yards (7.5 square meters). Entrance through the 3-foot (0.91-meter) door requires a humble crouch from participants, who number no more than five.

Guests kneel in front of the niche for a ceremony that can last up to four hours. In an ambience sweetened with incense, the host sounds a gong and carries in the prescribed utensils— a water jar, bamboo ladle and stand, lid rest, bowl washer, bamboo whisk, spatula, and tea caddy. The ritual begins with the passing of sweets, then the crushing of either thin or heavy tea leaves for stirring into water heated in a charcoal brazier or a sunken hearth. The tea, served in a communal bowl, passes from guest to guest, with the last participant finishing the remainder. After polite exchanges, the host removes the implements and the guests depart.

From the Monastery to Martyrdom

The tea cult got its start late in the 1190s, when Zen monks made tea their customary drink. They pulverized expensive green leaves, poured on boiling water, and whisked the powder with a bamboo beater. Daily, they sipped tea to keep them from nodding off during meditation. In the 1400s, the ritual evolved into a meeting of friends to sip tea and talk in sacred space at an isolated spot. The quiet, hospitable sharing of tea appealed to all levels, military leaders as well as aesthetes.

Influenced by Buddhist priest-poet Lu Yu's three-volume *Ch'a Ching* (*The Classic of Tea*, ca. 760 c.e.), Murata Shuko, tea master at the court of the Shogun Ashikaga Yoshimasa of Kyoto, initiated the use of a quiet tea building removed from town and reserved for meetings between heads of state, courtiers, and dignitaries. The antithesis of the resplendent palace hall, the tea hut enforced civility and equality before a steaming kettle. Just as the kettle shaped and controlled steam, the ambience constrained behaviors.

By blending Chinese and Japanese styles, Shuko perfected a spiritual ritual and

gave lessons to others in the Zen of intimate, personal tea service. Under his influence, tea became a social and meditational medium. An outgrowth of feudalism, the act of participating in a ceremonial tea, like European banquets, regulated and suppressed negative urges. Ritual promoted consensus and peace among belligerent lords, who approached the table unarmed and composed for a polite exchange. By association, the Japanese equated formalized tea drinking with refinement and international peace.



The classical Japanese tea ceremony, with roots in Zen Buddhism, ritualizes the preparation and pouring of green tea. A form of spiritual discipline and aesthetic contemplation, the rite cultivates both the sacred within and the national cultural identity. (*Sankei/Getty Images*)

In the 1580s, Japan produced its first tea master, Sen Rikyu, a cultured intellectual who thrived at court. In addition to being the unifier of Japan, he built a tea house near Kyoto and standardized the simple ritual as a time of quiet forbearance. In defiance of royal displays of wealth and attainment, Rikyu stressed harmony, respect, cleanliness, and tranquility. For his effrontery, the emperor ordered Rikyu's ritual suicide on February 28, 1591, a martyrdom that elevated the tea master to a cultural deity.

In ordinary homes, adherents of Rikyu built light, fragile tearooms screened with paper and a lattice transom. The ceremony became the goal of the bride-to-be, who concentrated on her role as hostess. The ritual took on an allure of the

peerless East and encouraged importers to sell beverages and matching tea services. In 1894, the World Food Fair in Boston featured home economist Sarah Tyson Rorer's Japanese luncheon and foreign table settings. The ritual took on marital significance in Joshua Logan's film *Sayonara* (1957), which dramatized the melding of races in wedlock. Other staged versions include *The Teahouse of the August Moon* (1956) and *The Last Samurai* (2003), a Hollywood fantasy.

Today, the Japanese tea ceremony follows the rules of Sen Rikyu. In January, celebrants boil the year's first kettle of tea; the year draws to a close with the austere November ceremonies and ends with December's last boiling of the kettle. The service enhances a contemplation of the passage of time, symbolized by antique implements passed down through family. In mid-June 2011 at the Hotel Duval in Tallahassee, Florida, a benefit for survivors of an earthquake and tsunami in Fukushima, Japan, chose a tea ceremony as a means of raising funds and honoring Japanese culture.

See also: Art, Food in; Tea.

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Temperance

Temperance, the self-regulation of behavior, applies to various areas of human life, especially food and drink. The world's religions through history— Buddhism, Christianity, Confucianism, Islam, Jainism, Wovoka and the Ghost Dancers, and Zoroastrianism, among others— have targeted extreme consumption, especially

the flaunting of costly, luxurious, and rare edibles and potables to the detriment of a wholesome life. Governments typically leave questions of consumption to communities, where alcohol plays an integral role in ritual and celebration, such as wine at a Jewish bris and a Greek Orthodox Eucharist. In 1644, the Scots added a new slant on consumption by instating the first alcohol levy, a governmental profiteering on intemperance.

From the early 1600s, ale, cider, liquor, and wine dominated beverage choices among settlers of the Western Hemisphere. Within a century, Boston, Jamaica, and Philadelphia rum traders turned distilling into profit. By the American Revolution, abstainers recognized the need for a national movement to control riotous drinking. In 1791, U.S. legislators mooted the question of nationally enforced temperance by passing a whiskey tax.

In the early 1800s, U.S. women made temperance a gender issue, forming phalanxes of teetotalers who disrupted public tippling and pressured elected officials to ban distilling and the sale of beer and liquor. In 1813, Boston reformers formed the Massachusetts Society for the Suppression of Intemperance, a crusade for community restraint. They focused on the neighborhood saloon as the fount of wasted wages and cruelty in men who used bingeing as an excuse for neglecting and abusing wives and children.

Politically, control of controversial diet elements produced unforeseeable results. The drive for sobriety generated xenophobia against immigrants, particularly German, Italian, and Polish Catholics, for whom beer and wine defined cuisine and culture for men, women, and children. In an unusual political pairing, mine owners and factory owners backed temperance as a means of eliminating absenteeism and on-the-job drinking and of raising productivity among immigrant workers.

As consumption of brandy, gin, rum, and whiskey reached 7 gallons (26.5 liters) per year per capita, the reform movement spread worldwide. In the 1830s, Australian men and women who were mockingly called Wowsers crusaded for sobriety and the closing of grog shops. A drive by Presbyterians and Catholics in England, Ireland, Quebec, and Silesia involved the signing of total abstinence pledges and the opening of temperance inns, which stocked no alcohol in their kitchens. Chefs revamped recipes, substituting applesauce or molasses for brandy in mincemeat pie and fruit juice for hard cider in Christmas punch. By 1840,

general consumption fell to less than half that of the previous two decades.

Sober wives and mothers surmised that inadequate home cooking increased men's thirst for alcohol. For guidance on ridding the home of intoxicants, abstainers turned to the anonymous *Total Abstinence Cookery* (1841) and the *Temperance Cook Book: Containing Practical Receipts for Plain and Rich Cooking Without the Use of Wine, Cider, or Alcoholic Liquors* (1841), published by the *Christian Herald*. Mormons and other zealous nondrinkers carried to extremes the ridding of the home of stimulants, including coffee, tea, and meat, an alleged spur to carnal appetites. In 1851, Maine set a national example of statewide prohibition, which passed to 12 states.

In the 1860s, defenders of Native Americans challenged the unregulated sale of alcohol on Indian reservations in the United States and Canada. According to Susan Allison, author of *A Pioneer Gentlewoman in British Columbia* (1976), indulgence in strong drink retarded the advance of civilization by debauching Indians. Canadians, taking a moderate view, passed the Canada Temperance Act of 1864, which left up to individual counties the choice of being wet or dry. Swedes in Gothenburg experimented in 1865 with a local monopoly on the sale and service of aquavit in city public houses. In Paris, the Academy of Medicine formed a temperance union in 1871 as an adjunct to health and sanity.

In 1877, First Lady Lucy Webb Hayes forbade the stocking of wine in the White House larder. Dubbed "Lemonade Lucy," she backed Frances Elizabeth Willard in the spread of the Woman's Christian Temperance Union (WCTU), which campaigned across the Midwest and Northeast. Author Hester M. Poole compiled *Fruits, and How to Use Them: A Practical Manual for House keepers* (1890), a nonalcoholic handbook that honored the WCTU by substituting fruit for sherry.

Passage of the Eighteenth Amendment to the U.S. Constitution on January 17, 1920, tested the practicality of superintending the individual's alcohol intake. Repeal by the Twenty-First Amendment on February 21, 1933, unleashed drinkers from artificial controls and restored voluntary restraint to drinkers besotted with illicit booze in speakeasies and drugstores. The formation of Alcoholics Anonymous in 1935 in Akron, Ohio, offered a workable compromise by placing the responsibility for imbibing on the reformed drinker.

Through the mid-twentieth century, the lingering effects of Prohibition

continued to impinge on the American wine and beer industries, which lagged until the revival of aesthetic wine tasting in the 1970s and craft beers in the 1980s preceded the revival of the martini in the 1990s. In a counter drive to protect teens, in Sacramento, California, in 1980, Candy Lightner organized Mothers Against Drunk Driving. In 2000, U.S. legislators set a blood-alcohol concentration of 0.08 as an arbitrary definition of drunkenness.

See also: Alcoholic Beverages; Beer; Charlemagne; Durante, Castor; Lunch; Religion and Food; Taboos, Food; Wine.

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Tex-Mex Diet and Cuisine

A fiber-filled cuisine melding cowboy tastes with cantina cookery, Tex-Mex fare fuses beef with the recipes and hearth techniques of Monterrey and interior Mexico. Touted as America's oldest and most popular national cuisine, Tex-Mex got its flair in the early-eighteenth-century mission era around San Antonio. It took its name in 1875 from the chartering of the Texas-Mexican Railway, dubbed the "Tex-Mex."

Original Tex-Mex cuisine incorporated smaller divisions, beginning with Az-Mex spiced chocolate and ranging to the Pacific and Atlantic shores for Baja-Mex

fish tacos and veracruzana ceviche and red snapper. Farther from the Texas-Mexican border lay the more recent Cali-Mex and New Mex, which contributed Pueblo corn dishes and elevated hamburger and pork above shredded beef in entrées. Additional elements drew on galleon traffic between Acapulco and Manila from 1561 to 1815, the source of rice dishes.

The Innovators

The first trans-Pecos food sharing derived from Apache and Pueblo cooks, Mexican *norteños*, and Tejanos, Hispanics born in Texas who make up 60 percent of the populace. Beginning in the 1820s with work-a-day meals of agave cacti, black beans or *frijoles refritos* (kidney beans well fried in lard), chorizo sausage, limes, onions, squash, sweet and mild chilies, and tomatoes and tomatillos, innovators added Texas beef to create dishes doubly rich in protein. Early experimenters tended to omit other Mexican staples—jicama, nopales, and prickly pears. In 1864, bakers adopted Austrian-French bread during the occupation by Emperor Maximilian I, introducer of the *bolillo*, a short loaf that emulated the hard-shelled French baguette.

In the style of Middle Eastern pitas and Indian naan, Mexican tortillas, the *masa harina* (cornmeal) or flour rounds used as edible containers, surrounded a variety of foods. Salsas and *moles* (sauces)—*adobado* (marinated in chili sauce), bitter chocolate, guacamole, *mole poblano*, *pipian* (pumpkin seed sauce)—demonstrated Central American know-how at blending healthful vegetarian mixtures to complement entrées. Quesadillas, cheese turnovers flavored with the Nahuatl herb *epazote*, required layering and toasting on a griddle or deep-frying in lard.

Cookery focused on baking in a *horno* (oven) and grilling over mesquite coals for *barbacoa* (barbecue) and *carni-tas* (braised meats) as well as the steaming of corn-on-a-stick with lime and of husk-wrapped tamales, a self-serve item created by pre-Hispanic Aztecs. Because of its blending of minced vegetables with small amounts of goat or beef, chili con carne earned the name “Southwestern pemmican” as a survival food for the poor. From 1880 to 1937 at the Military Plaza in San Antonio, the chili queens peddled their “bowl o’ red” for

a dime to cattle drovers and soldiers. Spanish priests denounced the hot stew as a devilish aphrodisiac. The health department halted the al fresco dish-up because of poorly washed utensils. The spicy bean-and-tomato dish fed non-Texans in 1893 at the Chicago World's Fair.

Hispanic cooks introduced fusion dishes to please Texans and Southwestern visitors. Pulitzer Prize–winning novelist Larry McMurtry demonstrated the crossover of Mexican and Texas cuisine in *Lonesome Dove* (1958), filmed for television in 1989. Around 1876, the fictional Mexican cook Bolivar feeds wranglers of a border cattle company on Texas meat and vegetables served Mexican style with chilies and *pan de campo* (wheat bread).

Commercial Fare

The outback fare predates by a decade Tula Borunda Gutierrez's ancestral meals in Marfa, Texas, at the Old Borunda Cafe, the first Tex-Mex vendor. She assured authentic flavor by importing mesquite wood from Fort Davis for slow simmering. O.M. Farnsworth of San Antonio followed Tula's example in 1900 with the Original Mexican Restaurant, which added fish to her beef-based menu. The dynamics of the gastronomic hybrid earned praise from *Texas Monthly* as "soul-binding, brotherhood food," a source of multicultural harmony. Less enthusiastic reviews hailed William Gebhardt's commercial chili powder and canned chili con carne, manufactured in San Antonio.

Additional cross-fertilization around El Paso coincided in 1916 with the flight of Pancho Villa's fighters out of range of capture. The expedient exile north of the Rio Grande introduced demands for the heritage cuisine of Spanish California — *albondigas* (meat dumplings), alligator pear (avocado) salad, chili verde, *cojets de leche* (caramels), flan, ranchera sauce, *sopa* Azteca (tortilla soup), Spanish rice, tamale pie, and tomato gravy. Revolutionary spirit charged mestizos with pride in their *indigenismo* and authentic native dishes.

In 1920, the *Los Angeles Times* concluded a 15-year effort to honor Southwestern foodways through cooking contests and recipe collections featuring the sour cream of German-American dairies and kumquats and oranges,

Recipe: Sopa Azteca

Cut 12 stale corn tortillas into strips and fry them in 2 tablespoons of oil. Drain. Roast six plum tomatoes over an open flame and remove the blackened peel. Heat two ancho poblano or pasilla chilies, two avocado leaves, 1/2 cup chopped onion, and one chopped garlic clove in a skillet. Mash all of the vegetables, moistening with 1/2 cup of water and seasoning with one sprig of *epazote* and sea salt. Boil the pulp in 1 tablespoon of oil. Add 4 pints of vegetable stock and cook for 30 minutes. Serve soup over tortilla strips and top with grated Chihuahua *queso fresco*, lime juice, chopped cilantro, and avocado slices.

pomegranates, and walnuts, all grown in California. Dish names captured the flavor of the Old West: Arizona enchiladas, chili Colorado, eggs à la *Mme. Murrillo*, Mariposa pudding, Navarino salad, and rice à la Valenciana. The unpretentious cooking style favored fritters, hash, omelets, moles, soups, and stews accompanied by Navajo fry bread with honey-dipped churros and sopapillas for dessert.

International Cuisine

In 1945, more than a century after the fusion of Anglo tastes with Mexican cookery, the term “Tex-Mex cuisine” appeared in print, creating a demand for authentic cookbooks. Chefs reorganized ingredients of the burrito, rolled enchilada, and taco meal in the 1950s in Tucson, Arizona, to include chimichangas, a blend of potatoes and spices with chopped beef. In 1964, a concessionaire in Dallas served the first nachos to attendees of the Texas State Fair.

The blended cuisine gained a champion in food maven Diana Southwood Kennedy, the British author of *The Cuisines of Mexico* (1972), who defined the mixed plates in terms of ethnic origins and alternative ingredients. Tex-Mex reached fad status and spread from the American Southwest throughout North

America to Asia, Europe, the Middle East, and South America. From Austin and Houston in 1973, the standard entrée menu acquired fajitas, a sizzling plate of marinated skirt steak with grilled peppers and onions washed down with a Mexican beer or tequila.

The development of chalupas, margaritas, and tortilla and yucca chips with salsa, three U.S. twists on south-of-the-border recipes, applied American ingenuity to gastronomic evolution. A Middle Eastern flair for cumin compromised the original Central American herb battery of chili powder and epazote. In the late 1960s, two other Anglo specialties—tacos and taco salad—harmonized Hispanic basics with lettuce and tomato, the makings of a restaurant side salad, topped with cheese and salsa or *pico de gallo*, a chunky tomato relish.

By the twenty-first century, salsa outsold ketchup as a condiment for the freshness and the nutritive value of tomatoes cubed with cilantro, onion, and peppers, all rich in vitamins A and C. The mainstream recipe alters the piquant Mexican salsa, made from chipotle, roasted *ricado* spice, and tomatillos. Innovative American salsas venture from vegetables to blends of chilies and sweet syrup with citrus fruit, mango, papaya, passion fruit, and pineapple. Vegetarians promote much of Tex-Mex innovation for its antioxidants, natural cancer fighters.

See also: Agriculture; Chili; Cookbooks; Grilling; Lunch; Packaging; Smoked Food; Tortillas.

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Theophrastus (ca. 371—ca. 287 B.C.E.)

The ancient Greek scientist, encyclopedist, and educator Theophrastus, whom Carolus Linnaeus called the “Father of Botany,” introduced classical concepts of physiology and nutrition to plant science.

Born at Eresus on the west side of the island of Lesbos, Theophrastus bore the birth name Tyrtamus. He studied under Leucippus and at Athens under Plato and Xenocrates, a protopsychologist, and became a reader of Empedocles’s writings on the elements and nature. At age 17, the young savant became a disciple of Aristotle, the tutor of Alexander the Great. To acknowledge Tyrtamus’s eloquent language, Aristotle renamed him Theophrastus (spoken by God).

Mentor and pupil traveled to Lesbos in 347 B.C.E. to study the island’s animals and plants. In 322 B.C.E., Aristotle’s will left Theophrastus the philosopher’s library, his manuscripts, and the guardianship of his children. As the lecturer at the Lyceum, a combination garden and covered *stoa* (portico), Theophrastus taught a lifetime total of 2,000 pupils, including the dramatist Menander, and succeeded as principal of the school from age 49 until his death at age 85. He maintained a botanical herbarium and studied Asian plants— banyan, cinnamon, cotton, frankincense, myrrh, and pepper— that Alexander’s troops imported to Greece from as far east as Persia, Afghanistan, and the Indus Valley. His systematic examination of plant foods introduced the Greeks to the argon palm, banana, cardoons, citron, jackfruit, jujube, mango, pistachio, and tamarind.

Drawing heavily on his mentor’s concepts, around 300 B.C.E., Theophrastus compiled two botany textbooks— the ten-volume *Historia Plantarum* (*Enquiry into Plants*) and the eight-volume *De Causis Plantarum* (*On the Causes of Plants*) — covering 550 species in all. The compendia influenced *Historia Naturae* (*Natural History*, ca. 79 C.E.), the Latin encyclopedia of Pliny the Elder, and remained valued reference sources throughout the Middle Ages. In *Historia Plantarum*, Theophrastus summarized the style of container gardening and horticulture in Greece and its environs. He touched on orchards— pruning and grafting—as well as culinary arts, such as the use of raw garlic and onions in salad dressings and sauces. He stated a preference for such wild collectibles as arbutus, cumin, dandelion, fennel, fern, lettuce, mint, parsley, rocket (arugula), truffles, and water chestnuts. The marsh mallow (*Althea officinalis*) he valued in

sweet wine as a treatment for cough and sore throat. He had a sweet tooth for such treats as the medlar and myrtle and yew berries, suggested pounded gladiolus bulbs as a sweetener for bread dough. The papyrus he particularized as a source of sweet juice for desserts.

Theophrastus studied botany as both a science and an element of the Greek economy. His survey warned of such common poisons as hellebore, hemlock, nightshade, and wolfsbane, which could sicken or kill herd animals. He promoted thick-seeded barley, heavy-bearing fig bushes and stone fruit, and such annual summer vines as cucumbers and gourds. For the home gardener, he described irrigation with well water as an effective way to increase succulence and sweetness in vegetables. In addition to evaluating cereals and pulses made from fava beans, lentils, millet, and sesame, he compared the yield for Babylonian and Greek farms and named chickpeas, lupines, millet, sesame, and vetch as the plants historically stockpiled as famine food.

Theophrastus savored his meals and recommended slow simmering as the best cooking style. He explained the aromatic appeal of apples, pears, and wine and the influence of fragrance on taste in carob and Phoenician cedar. He enumerated aphrodisiac foods and listed as culinary additives anise, bay leaves, and dill. For root vegetables, Theophrastus recommended the squill bulb and chopped asphodel mixed with figs, but he banished the turnip to peasant cuisine. His text recognized the value of cabbage grown in salty soil and proposed boiling cabbage leaves in *nitron* (sodium) to improve their color and flavor. In reference to high-end cuisine, he cautioned that the perfuming of dishes could spoil food and that storing herbs and spices near heat destroyed their flavor. *De Causis Plantarum* described the dual work of plants— producing seeds for reproduction and food for humankind.

In a lost treatise *On Sense Perception*, Theophrastus argued that taste and smell overlap. The brain is the seat of perception, he maintained, thereby linking the intellect with enjoyment of pleasant mealtime aromas, colors, tastes, and textures. He proposed that the cooking and digestion of such herbs as rue cause chemical changes that are detectible in the odors of breath and sweat. He warned of belching and flatulence caused by “vulgar radishes and pondered at length on the body’s need to rid itself of salt. The text covered appetite, fatigue, and stamina as well as the value of honey as a food and a wound dressing.

See also: Beans and Legumes; Cereal; Greek Diet and Cuisine; Plant Disease and Prevention; Poisonous Foods; Pulses.

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Tofu

A bland, low-fat curd of soymilk, tofu supplies the diet with a healthful alternative to meat. A Chinese vegetable food processed with calcium or magnesium salt or vinegar, bean curd took its name from the Chinese for “fermented bean.” Archaeologists have identified the Lia River valley in northeastern China as the region’s prime producer of soybeans. Legend from 164 b.c.e. during the Han dynasty connects the processing of soymilk with the scholarly Prince Liu An, who may have experimented with bean curd in imitation of an Indian or Mongolian curdling method.



Tofu, or soybean curd, is a high-protein cheeselike food sold in blocks in Taiwan (*shown here*) and across East Asia. Itself bland in taste, tofu absorbs other flavors well and blends easily. It can be prepared in myriad ways, in virtually unlimited combinations. (*Patrick Lin/AFP/Getty Images*)

The technology for making the cheesy substance spread to Korea and reached Japan after 710 C.E., then passing to Southeast Asia, Indonesia, and Pacific island clusters. The acceptance of tofu coincided with Zen Buddhist proselytizing, which required a nondairy, nonmeat diet. Monastery and temple kitchens may have been the original distributors of bean curd.

Late medieval Japanese recipes identified various forms of tofu—frozen and grilled curd, skewered in kebabs, and stewed in a broth. Tofu advanced in ritual importance in the sixteenth century, when ceremonial tea service included such curd foods as dried tofu with plum sauce as models of humility and austerity. During the Edo period around 1575, tofu appeared on the menu in Kyoto at the first restaurant, Nakamura-ro, as an element of haute cuisine. Chefs served *dengaku*, curd blocks topped with egg or nut miso and charcoal broiled to

enhance a creamy texture and sweetness.

A century later, Okutan Vegetarian Restaurant, one of the nation's most famous tofu venues, featured stewed curd, a popular dish with pilgrims who frequented Kyoto's Zen Temple. Chefs prepared a traditional Zen recipe by arranging boiled tofu on a tray of soy dips and vegetables. During the eighteenth century, Japanese tofu makers departed from coarse Chinese soyfood recipes to create soft, white curd cheese prized for its delicacy. The first soy curd cookbook, *Book of Tofu* (1782), cataloged 230 dishes. Its success created demand for a second volume, issued in 1783.

American tofu had its beginnings in the San Francisco Bay area in 1878 with the first soy milk shop, Wo Sing & Company at 708 1/2 Dupont Street. That venue and a second factory, Sing Hau Lee's Quong Hop & Company, catered to tofu aficionados in Chinatown and to Chinese laborers. Vegetable cheese surged to popularity in Sacramento and across California and, in 1923, spread to H. Iwanaga Daufu at 1031 Aala Street in Honolulu, Hawaii. Tofu, called *fromage végétal* (vegetable cheese) in French, found favor in Paris in May 1911 with Li Yuying's customers.

In 1929, Seventh-Day Adventist and manufacturer Theodore A. Van Gundy became the first Caucasian to process soy milk into cheese, which he first encountered at the 1915 World's Fair in San Francisco. His La Sierra brand of canned tofu required the addition of pimiento to keep the curd from graying. Until Van Gundy's death in 1935, health food stores hawked his products as cures for arthritis and ulcers.

During the 1940s, the Japanese military substituted tofu for meat in army rations. Ironically, in the 1970s, when postwar Japanese were serving tofu steaks with barbecue sauce to American tourists, Chinese Communists were rationing soyfood after prioritizing the use of soybeans for oil. In the 1980s, the curd came to Chinese markets more liberally as flour, noodles, rolls, sheets, and

[Recipe: Dengaku](#)

Cut 1 pound of firm tofu into 1-inch cubes. Lightly brown the surfaces evenly. Whisk over low heat 1/2 cup of miso paste with 4 tablespoons of

sake, 3 tablespoons each of sugar and water, and two egg yolks. Spread the sauce over the tops of the tofu cubes. Top with chopped walnuts or sesame seeds and broil until the surface browns.

squares and as a common street food simmered in soy sauce. At all social levels, tofu, served with cabbage and rice, became part of daily fare in southeastern China. Healers recommended tofu's phytoestrogens to women suffering from hot flashes and osteoporosis.

Depending on the amount of moisture extraction and preparation, tofu varies in density and texture, including smoked and deep-fried curd. Flavorings determine the role of tofu in a meal, whether mixed with chili sauce, dried shrimp, onion, or soy sauce for breakfast or blended with palm syrup as a sweet snack, a Filipino delicacy. The addition of black beans or edamame to the original curd turns tofu into a vegetable blend suited to a low-cholesterol diet. American recipes for tofu burgers, cheesecake, hotdogs, mayonnaise, meatballs, sausage, tamales, and imitation tuna salad increase acceptance of the Asian specialty.

See also: Asian Food Trade; Freeze-Drying; Grilling; Hot Pots; Mandarin Diet and Cuisine; Noodles; Szechuan Diet and Cuisine.

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[Tortillas](#)

Literally “small cakes” in Spanish, tortillas anchor the eating style of Central Americans and Pueblo Indians. The term originally identified a Spanish egg-and-potato omelet. For Mesoamericans, *tortilla* referred to a utilitarian toasted flatbread, made with corn, wheat, or occasionally sorghum, that contained or wrapped food. Aztecs made the first tortillas in 10,000 B.C.E., when the rounds began their way to prominence as a national dish. As both utensil and staple, the tortilla became a constant dietary presence, *el pan de cada día* (our daily bread), the food of millions.

Preparation began with a complex chemical process. *Nixtamalization*, the soaking of kernels in boiling slaked lime water or wood ash, moistened the endosperm and dissolved the pericarp, the tough outer hull. Culinary historian-anthropologist Sophie Dobzhansky Coe created the neologism from the Aztec *nixtamal*, the milky solution of corn with lime developed in Guatemala around 1500 b.c.e. At the same time that the transformation made the grain elastic, the process introduced calcium, protein, and vitamin B for the body’s use and prevented kwashiorkor and pellagra, both dietary deficiency diseases. The use of juniper ash also imparted an evergreen flavor and aroma. In *America’s First Cuisines* (1997), Coe credited nixtamalization with the expansion of Mesoamerican culture from village to empire and the rise of Paleo-Indians of the Mississippi River valley.

With the arrival of Hernán de Cortés and his 7,000 conquistadors in 1519, the Spanish changed the name of the flat cakes from the Nahuatl *tlaxcalli* to tortilla. The salted disks required heavy female labor for the crushing of kernels by mano and metate (stone roller and tray) and the baking of tortillas on a *comal* (griddle stone) for approximately 20 seconds per side. Women took pride in the individuality of a food that seemed to vary little from house to house and century to century.

Spaniards enjoyed filling the rounds with cheese, guacamole, *picadillo* (spiced meat sauce), and *pico de gallo* (chunky relish). Schoolchildren and field laborers packed lunches of tortillas and leftovers. Newly converted natives expressed their Catholic leanings by marking tortillas with a cross or crown of thorns. In the absence of communion wafers, priests served *santas tortillas* (sacred tortillas).

According to Renaissance encyclopedist and linguist Bernardino de Sahagún, the “Father of Ethnography and Culinary History” and author of *Historia General*

de las Cosas de Nueva España (General History of the Things of New Spain, 1540 – 1569), tortillas flourished in homes and as street food. Mexican peasants customized the palm-sized pancake with available fillings—ants, fish, *huitlacoche* (corn fungus), locusts, maguey worms, and snails. Diners chose from a variety of raw vegetables and hot *moles* (sauces). They developed a handhold that cradled the tortilla with the thumb and index finger, leaving the little finger to crook upward and seal the end to keep the contents from spilling. Tortillas also shaped easily into rolls and scoops for dipping or for tearing into strips to dunk into soup.

The back-and-shoulder-punishing labor of tortilla making ended for women in the first third of the twentieth century. On April 25, 1930, inventors Antonio Boué simplified manual tortilla making by patenting laminated rollers. The machine forced the *masa* (dough) through a cutter that standardized size and shape. An upgrade in March 1936 by Boué and Teodoro Gómez added a wire that scraped the tortilla from a cylinder and dropped the pancake onto a conveyor belt. Further tinkering altered rolling to pressure injection, the mechanism of commercial *tortilladoras*. By making flatbread readily available, industrialization revived mestizo cuisine in Mexico and Guatemala. In October 1956, Oscar Verástegui Santoscoy combined operations in an automatic tortilladora that mixed, extruded, and baked identical rounds 8 inches (20 centimeters) in diameter and 1/8 inch (0.3 centimeters) thick.

Whether patted out by hand or extruded from machines, tortillas have become prominent on the American baked grain market, becoming the second-most-popular bread after sliced wheat loaves. T. Coraghessan Boyle's satire *The Tortilla Curtain* (1995) uses the Mexican bread as an emblem of the Tex-Mex border, the dividing line between a have and have-not nation. Researchers estimate that Mexicans, for both cultural and economic reasons, continue to consume tortillas at an average daily rate of 325 grams (11.5 ounces) per person.

Tortillas figure in a variety of specialties—the burrito, enchilada, quesadilla, taco, tostado, and *totopo*, a fried tortilla. To spur the growth of the \$7 billion industry, makers introduced flavored flour rounds by adding cheddar cheese, jalapeño, lime, onion, tomato, and spinach. Tex-Mex, the Americanized version of Mexican cuisine, added the tortilla chip, a crisp strip that mounds into nachos and garnishes salads and soups.

See also: Aztec Diet and Cuisine; Corn and Maize; Genetically Modified Food; Religion and Food; Tex-Mex Diet and Cuisine.

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Trade Routes

The maze of routes by which food reaches consumers combines transport by air, river, road, and sea as well as overland portages and canals. After 4100 B.C.E., the Fertile Crescent initiated waterborne trade over rivers and canals in obsidian for kitchen knives and resins for sealing storage baskets and jars. Longer distances increased the opportunity for profit as well as the swapping of ideas.

From 3300 B.C.E., the Via Maris (Way of the Sea) connected Egyptian merchants with the Levant and Mesopotamia. The ancient commercial artery gained respect during the Crusades as a caravan route and pilgrim pathway. The success of intercontinental commerce valorized the skills of accountants, linguists, and cartographers.

After the domestication of the camel in 1500 B.C.E., Persian caravans traveled known arteries connecting west-central Asia with Arabia, the Levant, Phoenicia, and North Africa. Heavy traffic raised the importance of commercial centers in Alexandria, Egypt, and at Palmyra, Syria, and Petra, Jordan. Within 250 years, the networks expanded east to China and India, supplying rice, spice, and tea to

the western Mediterranean. Around 1000 b.c.e., Chinese junks traveled the Strait of Malacca to Sri Lanka, India, the Persian Gulf, and Axum, the capital of Ethiopia on the Red Sea. Chinese merchants also established a route east from Guangzhou to the Solomon Islands to trade in dolphin, shark, swine, and turtle meat.

Because sea transport became safer, surer, and swifter than desert or mountain crossings, Athenian and Egyptian food dealers increased reliance on sea-lanes. To the west, Berber caravans trekked through Tuareg country in Algeria and Libya, a source of camels and goat meat as well as dried butter and cheese, dates, and millet. Pack trains crossed the Sahara Desert to access salt fish from the Song-hay of the Sahel and the kola nuts and salt of Bamako, a business nexus on the Niger River in southwestern Ghana. Local potentates filled their coffers with duties and tolls from steady traffic of cattle and slave buyers.

From the 700s B.C.E. to 100 C.E., Greeks expedited commerce by crossing the Diolkos, a portage over the Isthmus of Corinth that linked the Bay of Corinth with the Aegean Sea. Sailors dragged their merchantmen across 4 miles (6.4 kilometers) of limestone track and returned them to sea to carry fresh provisions to the military. Similar shipping shortcuts on the Nile River delta at Alexandria sped dhows, small lateen-sailed coasters, from the river to the Mediterranean. Additional saltwater commerce east on the Red Sea supplied Egypt with spices from Arabia and coffee and millet from the Horn of Africa.

To feed the cosmopolitan region around Rome, merchants dominated Mediterranean commercial arteries and pressed north to German and Slavic territory as far as the North Sea. In addition, aqueducts directed water from highlands by gravity to consumers, flour mills, and food processors, including makers of *garum* (fish sauce), a major Roman export. From Egypt across the Sinai to Aqaba, Jordan, the King's Highway directed traffic south and east, the future artery of Islamic food commerce to northwestern Africa. Paralleling land transport of grains, seeds, and wines, the Spice Route took Chinese cargo vessels south to Java and east along Indian Ocean ports to India to sell cardamom, cassia, cinnamon, ginger, pepper, and turmeric, an essential of Indian cuisine and food coloring.

Across southern Asia, Roman engineers fortified the Grand Trunk Road, which accessed rice and spices through the Khyber Pass and southeast along the Ganges

River through Delhi to Calcutta. Simultaneously, Roman merchants traveled to the British Isles as far north as the customs inspection site at Hadrian's Wall, begun in 122 C.E. On safe Roman roads, haulers bore Gallic and Iberian olive oil, olives, and wine to exchange for Gallo-Belgic dinnerware, cattle, hunting dogs, oysters, and salt.

Medieval Commerce

From the 700s to the 1000s, Varantian (Scandinavian) traders approached Eastern Europe emporia via the Dnieper, Don, and Volga rivers. Waterways carried their long ships down the Dnieper to the Black Sea and Byzantium and to warehouses on the Caspian Sea and Baghdad. With stocks of furs, honey, and meat, Varantian traders bartered for bread and spices.

During the eleventh-century clash between Christians and Muslims, the rise of the Italian maritime republics of Amalfi, Ancona, Genoa, Pisa, and Venice increased competition for military food contracts in the Holy Lands. Beginning in 1096, Italian city-states enriched themselves on army provisions for the Crusades, which required barley, beans, chickpeas, dried fruit and meat, lentils, and wine. Provisioners boarded sea transport to complete deals at entrepôts in Christian-held ports at Alexandria, Antioch, Constantinople, Corfu, Crete, Cyprus, Dalmatia, and Istria. The busy sea-lanes crisscrossing the Mediterranean enticed Cilician pirates, who offloaded foodstuffs from captured vessels to supply the enclaves of privateers in southern Turkey.

In times of famine, Christian armies avoided high prices in Turkey by holding out until European supply ships arrived at Joppa, Israel, and Nicaea, Turkey. On return over the direct sea route around Iberia to northern Europe, vessels carried Mediterranean goods—citrus fruit, figs, nuts, palm oil, pepper, pomegranates, sesame seeds, spices, and wines. The arrival of exotic foodstuffs spurred British, Belgian, Dutch, and Iberian trade to the Middle East, fueling the trade wars of the sixteenth and seventeenth centuries for dominance of major trade routes.

In South America, the roadways of the Wari Empire from 600 C.E. served as the template for Qhapaq Nan, the Inca highway, an advanced coast road linking Cuzco and Quito, Ecuador, with Santiago, Chile. Ranging up to 13 feet (4 meters)

wide, the system traversed Andes fens and slopes with stone highways and reed and stone bridges. Llama caravans brought craft items, herbs, meat, and vegetables to lowland villages and inland to Argentina and Bolivia. The route to Machu Picchu, Peru, carried corn, fruit, potatoes, and sweet potatoes for barter at livestock markets.

On the other side of the globe, Henry the Lion of Saxony founded the Hanseatic League, which functioned in Lübeck from 1159 to 1630 as a price stabilizer for German resins, rye, salt, and wheat. Because the Catholic Church tightened its Lenten requirements, the herring preserved by net fishermen in Scania, Sweden, gained economic importance as a nonmeat protein transported throughout the Christian world. Along the northern sea routes, Livonia and Prussia contributed butter, grain, and horses. Trading vessels journeyed east to merchant guilds in Danzig, Riga, and Novgorod and west to Hamburg, Brügge, and London. Throughout the Baltic region, the league suppressed piracy against slow-moving grain barges by dispatching armed guards aboard commercial convoys.

From the late 1500s to the early 1800s, triangular trade linked African, American, Caribbean, and European sites in transatlantic commerce based on slavery. The northern route took Southern corn and Canadian salt cod to England for exchange with woolen manufacturers. Profits paid for the purchase of black abductees and convicts from the Bight of Benin and west-central Africa. The Middle Passage carried slaves northwest from the port city of Elmina, Ghana, to Barbados, British Guiana, Jamaica, Puerto Rico, Santo Domingo, and Trinidad for sale to cacao, coffee, and sugar plantations. Return loads of sugar and molasses traveled up the Atlantic Coast to New England stocked distilleries selling rum. The sale of rum in Africa yielded cash for the lading of more slaves for American corn, cotton, and tobacco producers.

North American traders took advantage of major waterways, turning the Chicago, Des Plaines, Ohio, Mississippi, and Missouri rivers and the St. Lawrence Seaway into commercial arteries. Lacking cash, Indians bartered for horses in exchange for corn, dried meat, pemmican, and pumpkins. Along the Great Lakes, a lively trade in salmon, smelt, trout, and walleye encouraged swaps with the Cree and Erie for furs, meat, and nuts.

Beginning in the 1850s, frontier families took wagon trains from barge wharfs

in St. Louis over the Oregon Trail and the Santa Fe Trail to the American Southwest. Freight wagons, pulled by horses, mules, or oxen, followed settlers crossing the Rocky Mountains to commercial centers in Virginia City, San Francisco, Salt Lake City, Portland, Seattle, and Vancouver. A string of forts guarded the routes and escorted families through dangerous passes. Indigenous tribes profited from the flow of settlers by trading food for liquor, livestock, and metal knives and cook pots.

Rail Routes Beyond

The establishment of commercial rail networks followed ancient trails with more safety and speed than dray animals and wagons of previous centuries. In England, the 1844 Railway Act linked cities with outlying farm and herding areas in commerce governed by William Gladstone, president of the Board of Trade. Similarly, in 1856, the Rock Island Railroad and the Illinois Central, the world's longest track, linked Cairo, Illinois, with New Orleans, the heart of the U.S. slave and sugar trade.

Beginning in May 1869, the Union Pacific transcontinental rail line to Sacramento, California, benefited commerce as never before, restoring Southern sales of cotton, molasses, rice, sugar, and syrup to the former Union states and the far west. In the boom years, prairie farmers and ranchers supplied northeastern restaurants with fresh beef and grain from the heartland. A complementary boost in rail-to-barge trade via the Mississippi River from New Orleans to Cairo, Illinois, lowered prices throughout the Mississippi valley.

A parallel link in California enhanced business in dried fish, pineapples, rice, and sugar from Honolulu and Lahaina, Hawaii, via regular steamer service to the islands and Australia. The success of transpacific trade preceded the 1875 Reciprocity Treaty between Hawaii and the United States for exclusive rice and sugar trade rights. The alliance of entrepreneurs with the U.S. government ensured extensions of intercontinental trade via direct routes to Yokohama, Japan, and Shanghai.

The advance in rail lines established new trade routes. The extension of the Baltimore & Ohio and the Pennsylvania Railroad in 1886 sped canned goods,

Eastern fruits, meats, processed foods, and vegetables throughout the Ohio River valley. The completion of the Canadian Pacific Railway in 1885 from Thunder Bay on Lake Superior to Winnipeg advanced trade with Vancouver. At both Atlantic and Pacific outlets, fast service boosted agricultural profits from Canadian wheat.

Railroad engineering enabled Asians to augment their diet with global imports. In March 1891, Nicholas II, Russia's future czar, initiated the building of the Trans-Siberian Railway, which connected Moscow across Siberia to Vladivostok and by sea to Japan. The addition of the Chinese Eastern Railway from Chita, Siberia, to Harbin, China, increased the flow of foodstuffs to Russia's frozen east.

In the twenty-first century, the flow of foodstuffs from industrialized countries by air, land, and water profits from containerized freight, refrigerated dairy products, eggs, fish, fruits, and vegetables transhipped in cellular loads by crane from ships' holds and rail flatcars to trucks for rapid transfer to small towns. The concept, initiated as Sea-Land Service, in 1955 by shipper Malcolm Purcell McLean of Winston-Salem, North Carolina, and engineer Keith Walton Tantlinger of Orange, California, defeated the ancient and medieval concepts of static trade routes by increasing outreach to isolated locales. Shifting needs from small piers to container equipment reduced the importance of the choked Strait of Sunda and Strait of Malacca; shut the ports of Liverpool, London, Manhattan, and San Francisco; and transferred trade route destinations to larger facilities at Felixtowe, England; Rotterdam, Holland; and Oakland, California.

See also: Abreu, António de, and Francisco Serrao; African Food Trade; Caravans; Clipper Ships; Hudson's Bay Company; Maritime Trade Routes; Peppers; Silk Road; Trading Vessels.

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Trading Vessels

Since the end of the first millennium B.C.E., the expansion of the global food market has relied on stout merchant vessels. Shipwrights designed the first cargo carriers to transport fish, grain, meat, produce, spices, and wine along oceans and major water routes, primarily the Danube, Nile, Rhone, Tigris and Euphrates, and Yalu rivers. The reciprocal exchange of agricultural goods and food technology between peoples liberated regions from limits on cuisine and improved the choices for farmers and herders through the importation of seeds, plants, and livestock, such as the fast-growing South African Dorper sheep to Australia and the soft Spanish Merino sheep to Sweden. Because sea transport outpaced overland hauling over desert or mountainous terrain, ancient Athenian, Egyptian, and Phoenician food dealers preferred ships to caravans. They developed the shallow coaster for short hauls of fish, grain, and wine to ports surrounded by reefs and shoals. As early as 2500 B.C.E., the Egyptians risked sailing by coaster southeast to the unidentified land of Punt (probably Eritrea) to trade for shorthorn cattle. Other ventures by Arabs, Chinese, Indians, Malaysians, and Persians focused on aromatics, jewels, and metals, but less often on food.

The Phoenicians earned acclaim as the earliest masters of commercial trade routes as far away as Cornwall in southwestern England. Because of rocky soil unsuited to growing grain, Cretan farmers around 1200 B.C.E. exploited commerce in fine olive oil and rich wines in exchange for wheat from Israel and Judah. Trade increased demand for coins, the medium of exchange that facilitated quayside dealing in perishable goods. Beginning in 1000 B.C.E., larger Mediterranean freighters bore bales, resin-sealed jars, and sacks of trade items for sale at a distance from their provenance. Period modifications to naval biremes and triremes (galleys with two and three rows of oars on each side) enabled captains to haul livestock for auction in distant ports. Around 400 B.C.E., cargo vessels ventured as far as Egypt, Hispania, Lydia, and Mauretania (present-day

Morocco).

The growth of the Athenian state economy depended on further improvements to fleet speed and naval technology, such as the adjustable deck canvas to protect baskets of fruits and vegetables from sun and wind. By 600 B.C.E., Athens led the Mediterranean in marketing olive oil and wine, both of which shippers transported in 3-foot (1-meter) clay amphorae, each holding 6 gallons 7 pints (26 liters) of dry or wet foods.

Shipbuilders rigged coasters with sails to free the space usually filled by rowers and oars for cargos of *defru-tum* (fruit paste or syrup), figs, *garum* (fish sauce), grain, honey, nuts, oil, and *mustum* (crushed grape pulp and skins), and such exotica as capers, mushrooms, oysters, and truffles. Lading of amphorae (tall jugs) required nestling each jar point-first between the shoulders of the bottom row and packing the spaces with straw to absorb the ship's roll. A molded terracotta bas-relief from Pompeii depicts two slaves bearing a jar, which they had tied with a thong that they slung over a pole. By shouldering their burden, the bearers allowed the jar to swing freely on its way up the gangplank and into the hold. Around 300 B.C.E., four Greek sailors could load and maneuver an entire shipload of 400 amphorae of oil and wine to Cos, Cyprus, Samos, and Rhodes.

Perils at Sea

Theft dogged sea-lanes. For Chinese and Japanese junks, in 400 B.C.E., freebooters created havoc at the straits between Singapore and Indonesia. Paralleling commercial routes, piracy shadowed the most successful routes of Greek and Roman super-galleys, especially along the eastern Mediterranean south of Cilicia and Illyria, off the islands of Crete and Delos, and throughout the Red Sea shoreline. In 230 B.C.E., the Roman Republic underwrote 200 ships and 20,000 marines under Consul Gnaeus Fulvius to annihilate the Illyrian mercenaries who preyed on convoys from Egypt, North Africa, and Sicily of grain for the army. Within two years, Fulvius swept clean the eastern Mediterranean pirate sanctuary. The action freed merchants to engage in transoceanic trade and rid Rome of its fear of famine. The suppression of seagoing outlaws improved Roman trade to the Black Sea and between the Arabs

and Somalis along the Red Sea. Under the implementation of the *annona* (poverty relief) during the reign of Augustus, Rome's first emperor, the nation had to import 14 million bushels (500 million liters) of wheat per year to stave off hunger from the plebeian class. Lest the nation found er from an unfavorable trade balance, Roman shippers engaged in ongoing trading voyages, even during the dangerous winter months, the period that saw the greatest loss of sailors, goods, and vessels.

In the Middle Ages, port cities dominated the food trade. Of 86 imported agricultural goods, 44–51 percent were spices. In the 900s C.E., Viking trade networks sped longboats beyond the Baltic and North seas. The development of holds to accommodate bulk stowage increased sale of dried Norwegian cod from Ribe in Jutland to buyers in Asia, Greenland, and Western Europe. Following the decline of the Byzantine Empire, Muslim and Slavic pirates raided the dockside ware houses of Rome and Venice with hit-and-run tactics, driving down profits and raising prices on imported herring, salt, seeds, spices, and tallow. Merchants lowered overhead around 1000 C.E. by increasing the cargo capacity of vessels to more than 20 tons (18 metric tons). Among German grain dealers, formation of the Hanseatic League by Henry the Lion of Saxony in Lübeck in 1159 stabilized prices by evening out surpluses and crop failures of rye, salt fish, and wheat.

Technological Breakthroughs

During a peak in commerce in spirits in the late 1200s, ships arrived in the port of London carrying as many as 200 barrels of beer or wine each. The addition of hops to brewed beverages lengthened the time that sea captains could transport fresh batches before they soured. By 1340, the convenience of slewing cranes that rotated horizontally over Europe an harbors sped the loading of baskets, pallets, wine barrels, and wooden crates. Agricultural surpluses in cheese, ham, oats, rye, and vegetables increased the activity of vessels between England and Scandinavia.

During hostilities between Denmark and Sweden in 1392, a pirate guild called the Vitalienbrüder (Victual Brothers) focused on clumsy fish-and grain-laden cogs (large-hulled cargo ships) and returned with the spoils to Stockholm, then

under siege. Open season on freighters threatened the region's economic stability. Because of the success of the *Seetiger*, captained by Klaus Störtebeker of Gotland, the herring trade on the Baltic Sea collapsed within two years and remained suppressed to 1440 as far north as Bergen, Norway, and south to Iberia.

In the fifteenth century, navigational advances in lateen sails and stern rudders resulted in the easily steered, adaptable caravel, which prefaced a golden era of sea trade. The ship's speed and broad beam enabled Iberians to make longer sea voyages and to carry 130 tons (118 metric tons) of trade goods. Portuguese writer Duarte Barbosa, who sailed with navigators Pedro Alvares Cabral and Ferdinand Magellan from 1500 to 1521, observed the value of trading vessels to world culinary exchange. At the port of Mogadishu, Somalia, Barbosa remarked on the availability of barley, fruit, horses, meat, spices, and wheat delivered by traders from western India. The speed and safety of sea voyages replaced slower, more treacherous overland travel from Europe over the Silk Road to China and the haphazard packing of cardamom, ginger, sesame seed, and white pepper on camels and donkeys. However, adventurers paid the price of daring. Attackers, marooning, reefs, scurvy, and storms took the lives of many men who risked all to enrich themselves on the global trade in coffee, spices, sugar, and tea.

East Indiamen, the largest cargo vessels, served European commercial ventures by the British, Dutch, and Swedish, who organized convoys to protect valuable goods. Warships and auxiliary cruisers sometimes escorted trader fleets through the most treacherous sea-lanes. The rich global food trade influenced Portuguese navigators to plot new water routes to the Spice Islands around the opposing currents of Africa's Cape of Good Hope. The lure of instant fame and wealth directed Christopher Columbus toward the New World. The Chinese and Spanish trade with Luzon, in the Philippines, in the early 1500s extended commerce in bird's nests for soup, cinnamon and ginger, honey, porcelain dinnerware, table linens, and benzoin and caribou horn for medicines.

In *Suma Oriental que trata do Mar Roxo até aos Chins* (*Survey of the East, from the Red Sea up to the Chinese*, 1512–1515), Portuguese explorer Tomé Pires reported steady seagoing traffic by Arabs, Burmese, Chinese, Filipino, Indians, Japanese, Malays, and Thais to the international port of Melaka (Malacca), Borneo, on the shortest run between China and India. To facilitate harbor transactions, the Melakans insisted on standard coins and weights and measures.

At Sumatra alone, Pires marveled at trade in oil, rice, shad, and wine and in durian and tampoy, two luscious fruits. At Java, he remarked on the availability of cardamom, oil, pepper, tamarind, and wine. In exchange for Javanese goods, the Portuguese introduced islanders to butter and cheese, which were unknown.

British Sea Power

During the 274 years that the British East India Company (BEIC) dominated commerce in Asian foods and beverages (1600– 1874), the firm made no advances in the speed or size of its vessels. Mercantile agents chartered heavy noncombatant merchantmen to navigate routes between London and central and eastern Asia. Under the leadership of Admiral James (or John) Lancaster, skipper of the 600-ton (540-metric-ton) *Red Dragon*, the BEIC launched its first voyage from Tor Bay, Sumatra, on February 13, 1601. For some 30 annual expeditions from the Far East around South and West Africa to England, loaders packed company holds with alum for pickling and baking powder, areca nuts, jaggery (black sugar), cardamom, China root (sarsaparilla), cinnamon, cloves, coconuts, ginger, pepper, rice, tamarinds, turmeric, and wax for sealing preserves. To protect valuable cargoes from capture, King James I fought piracy in 1604 by ordering the impounding of the privateers' lands and cargoes. In April 1608, William Hawkins navigated the *Hector* past Madagascar and the Seychelles to Gujarat, becoming the first English trader on the Indian subcontinent. In 1609, a company dockyard at Deptford on the River Thames built swifter freighters but not in time to save Hawkins and his load of pepper from Algerian pirates.

To protect valuable trade in molasses, sugar, and tobacco from North and Central American shores, the British admiralty outfitted merchant vessels with cannon and light armaments. To save money, shipwrights painted fake loopholes and simulated defensive weaponry by disguising equipment as artillery. In 1700, brisk Atlantic trade between Great Britain, the West Indies, and the American ports of Charles Town, Boston, Newport, New York, and Philadelphia required constant surveillance to protect stores of dried and pickled fish, flour, rice, rum, sugar, tobacco, and wheat. On transpacific voyages in the 1770s, shippers who included stops at Lahaina, Hawaii, got more for their money, while loading up on

fish, fruit, meat, tallow, taro, and whaling products. In exchanges with Europeans, Hawaiians acquired cattle, chickens, goats, and sheep as well as liquor, which debauched all classes of islanders. The importation of grazing animals turned the island economy toward success in livestock husbandry.

The BEIC set world records for success in intercontinental commerce. At the exchange market at Singapore, trade in betel nut, black pepper, cardamom, fish, medicinals, red cane sugar, rice, salt, and tea borne by Cantonese and Siamese junks from 1800 to midcentury was lucrative for both parties. With the introduction of *Camellia sinensis* tea from Assam, India, in 1823, the BEIC purchase of American clipper ships with hydrodynamically efficient clipper bows sped global food distribution in half the time required by deep-draft merchantmen, thus delivering fresher produce to market. Until competition from private companies forced the disbandment of the BEIC in June 1874, the British monopoly commanded the planet's largest merchant navy and controlled half of world trade in such commodities as beer and porter, coffee and tea, pickles and salt, rum and molasses, and wine and cheese.

The New Superpower

By the 1860s, during an era of New World transportation breakthroughs, the U.S. merchant marine seized dominance of global shipping with the largest, sturdiest, and most specialized vessels afloat. The square-rigged, three- or four-masted clipper ship, in the final decade of its control of light freight before the advent of steamers, maintained swift trade in opium, spices, and tea between North America and Asia. In China's harbors, flat-bottomed sampans carried tea chests to the waiting clippers for the dash to London. A more capacious tall ship, the four- or five-masted windjammer, built in Finland, France, and Germany, carried barley, rye, and wheat typically from Australia or South America to Europe from the 1870s into the early 1900s.

The production of steel by the Bessemer process replaced wood, cast iron, and wrought iron parts for steamers, a technological advance that inhibited fires at sea and hold damage by woodworms. Stronger, more flexible steel suited the demand for boilers, steam engines, gears, propellers, and ships' keels and masts.

Improved manageability enabled navigators to avoid icebergs, a common doom of freighters rounding Tierra del Fuego, at South America's southern tip. Consumers profited from refined shipbuilding — the finer the machining of boilers and pistons for use at high pressure, the lighter the hulls and the greater the fuel efficiency. Because steamers lowered hauling rates, shoppers enjoyed reduced food prices on such imported goods as coffee, rice, spices, and tea.

During the 1860s, U.S. merchants strove for global shipping routes and the hiring of merchant mariners. Inland ships and barges carried supplies, passengers, newspapers, and the U.S. mail over the Great Lakes and into the American heartland. River transport to the Upper Missouri River carried New Orleans commerce as far north as the Arctic Circle. By 1866, northwestern wharves received an annual freight of 4,441 tons (4,028 metric tons) distributed as far west as Walla Walla, Washington. As a result of post-Civil War commerce, Honolulu thrived from shipping and whaling traffic. Occidental and Oriental shipping from Australia through the Hawaiian Islands to California increased the flow of investors to Pacific Coast orchards, ranches, strawberry fields, and vegetable farms. In southern California, citriculture turned Duarte and National City into lemon and orange packing and shipping centers. In 1870, the United Fruit Company, one of the first multinational corporations in the Americas, began monopolizing transport of bananas from Costa Rica, Guatemala, and Honduras to the United States. The 1876 Centennial Celebration in Philadelphia boosted the banana to national prominence, thus introducing a lucrative market to American produce shippers.

World trade advanced to an exchange of fresh foodstuffs unprecedented in the planet's history. After the opening of the Suez Canal on November 17, 1869, food carriers lopped 36 days from the ocean route between London and Calcutta, metaphorically shrinking the globe and speeding Indian wheat to England at a low price. Humanitarians lauded the shortened routes to sites of Third World disasters, where the offloading of food and pure drinking water prevented mass deaths in Brazil, China, Ethiopia, India, Russia, Sudan, and Tanganyika.

World Wars I and II plagued global merchantmen with danger from German U-boats armed with torpedoes. Allied forces made double use of escorted convoys and air cover. Provision supply ships eased the scarcity of necessities while luring German submarines to Allied battleships. Use of depth charges, barrels filled with

explosives, enabled the battleships and cruisers to destroy U-boats and free the convoys to replenish dwindling coffee, meat, medicines, and sugar for Allied regiments.

High-Tech Shipping

Twentieth-century technology upgraded U.S. merchant marine fleets, which expanded under the Shipping Act of 1916. This act regulated food shipments by Great Lakes and oceangoing barges and merchant vessels. In the late 1940s, technology on reefer ships designed by the United Fruit Company improved refrigeration, which Scots shipwright Robert Duncan had introduced in 1874 with the building of the three-masted clipper *Dunedin*. In the mid-1900s, cargo chilling answered a demand for highly perishable goods, such as fresh asparagus, avocados, caviar, milk and butter, poultry, seafood, and strawberries, especially from Australasia and South America. Use of Bell Coleman equipment, a four-stage refrigeration system, assured the cleanliness and purity of frozen meat from New Zealand to Great Britain.

To decrease chances of spoilage of beef and mutton, hares, pork, and poultry from New Zealand, shippers built abattoirs adjacent to docks in Port Chalmers. In 1948 aboard the SS *Yaque*, the first of nine in the United Fruit Company fleet, sealed compartments allowed carriers to individualize air cooling and humidity to slow the ripening process in apples, bananas, citrus fruit, and kiwis by forcing them into artificial hibernation. Bins designed to hold hanging bunches of bananas gradually gave place to hand-packed storage boxes stacked on pallets and loaded on strong gratings through side doors rather than from above by crane. A double-skinned hold encouraged even cooling and freezing via circulated air and ongoing defrosting by powerful heating coils. A quality-control system monitored the ventilation and temperature control required by each food and released ethylene to inhibit pathogens and kill insects; however, lowered oxygen content in compartment atmosphere threatened crew with suffocation.

Another post-World War II advance, container freight, invented in 1953 by trucker Malcolm Purcell McLean of Maxton, North Carolina, shortened the time necessary to empty train and truck contents into ships' holds by loading the

entire container without jostling or repositioning the goods. A revolution in merchant hauling, the container freight system of shipping allowed transporters of perishable goods, such as bananas, grapes, peaches, pineapples, plums, melons, and other tender fruit, to complete the delivery with less handling damage and delay. Dole Fresh Fruit International adapted refrigerated technology by applying the containerized freight concept aboard reefers, such as those offloaded at the Dole trucking yard in San Diego harbor. By supplying grocers with fresh tomatoes and fruit from the Northern and Southern hemispheres, freighters extended the range of produce availability and opened new markets for food growers.

See also: British East India Company; Clipper Ships; Dutch East India Company; Gama, Vasco da; Maritime Trade Routes; Portuguese Diet and Cuisine.

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Trans Fat

An unsaturated fatty acid, trans fat contributes to cardiovascular disease by elevating cholesterol and triglycerides in the body. The sticky nature of trans fat clogs arteries with plaque, restricting blood flow to major organs and heightening risks of heart attack and stroke. Trans lipids increase belly fat and raise levels of triglycerides in the blood, encouraging atherosclerosis or hardening of the

arteries.

In 1883, although Canadian officials banned margarine, a Newfoundland spread producer hydrogenated fish, seal, and whale oil and bootlegged the product throughout Canada at half the price of butter. The presence of harmful fat in the diet from beef, cocoa butter, coconut oil, dairy foods, mutton, palm and palm kernel oil, and pork increased after the hydrogenation of margarine and vegetable oil in the 1890s by French chemist Paul Sabatier. By treating substances with hydrogen, he solidified margarine for the table as a cheap, shelf-stable substitute for butter. The chain of saturated fats made chicken legs and fried fish crisper and biscuits, cheese, ice cream, and popcorn more flavorful.

By the twentieth century, some 40 percent of supermarket products contained dangerous saturated fats. In 1909, production of solidified fats in England and the United States preceded the creation of Unilever's Spry and Crisco, Procter & Gamble's hydrogenated shortening made in part from cottonseed oil. Crisco rapidly replaced animal lipids— beef tallow, butter, and lard— in American recipes. Consumers preferred margarine for table use because of its spreadability, even when cold. As a result of increased intake of trans fat, 7 percent of human breast milk in Canada and the United States consisted of harmful fatty acids that may have contributed to the onset of Alzheimer's disease, cancer, depression, diabetes, infertility, liver failure, and obesity. In 1947, physiologist Ancel Benjamin Keys began studying cholesterol and its role in the rise of fatal heart attacks in American men.

Preliminary research into trans fat health hazards in the 1940s and 1950s preceded analysis in the 1990s, which confirmed ties to coronary disease from regular intake of chocolate, doughnuts, hamburgers, macaroons, pastry, peanut butter, and yogurt. Gradually, according to the Mayo Clinic, industrial food companies began to identify less harmful fat— avocado, canola, olive, and peanut oils— on the label. In 1994, health experts charged trans fat with causing 20,000 deaths annually from clogged and inflamed arteries and overworked heart muscles and insisted on the listing of harmful fat in food contents. On July 10, 2002, the Institute of Medicine challenged the nation to reduce its trans fat intake to zero.

Negative publicity began the downfall of trans fat in processed foods. By 2004, Unilever's Canadian markets featured only margarine products free of trans fat.

In 2006, the National Institutes of Health and the U.S. Department of Agriculture rejected palm oil as a substitute for trans fats. A year later, the U.S. Food and Drug Administration coerced Procter & Gamble to reduce trans fat in Crisco to no more than 7 percent. The company created a new shortening from palm, soybean, and sunflower oils.

Public demand for reduced trans fats forced the reformulation of baked and fried goods, fast food, and snacks. Other products following low-trans-fat formulations included Girl Scout cookies, Oreos, and menu items from Arby's, Burger King, Kentucky Fried Chicken, Chick-fil-A, McDonald's, Taco Bell, Walt Disney Company, and Wendy's. In 2011, New York City banned trans fats from restaurant fare. In September 2011, Monsanto announced a breakthrough in lessening of fatty acids in the genetic modification of low-fat soybeans.

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Travel Food

The selection and packing of travel food has affected the military, pilgrimages, sailing, and trading throughout history. During the Neolithic revolution around 12,000 B.C.E., the large seeds of einkorn wheat produced digestible, easily chewed roasted grains for campfire meals. Pouches of charred or roasted grain bore a tasty, fragrant, and lightweight pocket meal easily loaded and eaten out of hand

without further cooking or worry of spoilage.

Into the Middle Ages, travel food developed character and variety. Yogurt, first coagulated naturally in Sumer in 6000 B.C.E., dehydrated into a nomad's snack. Armenians and Egyptians wind-dried camel and goat meat for *pastirma*, a spiced packable meal for unhurried chewing. In the first century B.C.E., Apicius, a Roman culinary writer, chose *mulsum* (honeyed wine) to fill his flask. At taverns and roadside stops in Iberia, canteens of cider gained respect as a sweet, energizing thirst quencher.

During the Crusades, journeyers to Jerusalem bought baklava and soup from street vendors, peach turnovers and meat pies at inns, and sacks of almonds, chickpeas, melons and apples, pistachios, and walnuts at food stalls. By the fifteenth century, the speed and safety of sea travel replaced slower, less comfortable overland routes and the awkward loading of food and drink on dray animals. During the Renaissance, European pilgrims packed cheese wedges and flatbread for outdoor repasts and evening pos-sets of valerian for untroubled sleep. In the 1830s, Dutch Voortrekkers of South Africa rubbed desiccated ostrich or venison strips with vinegar, salt, and herbs to make biltong, a rock-hard cured meat similar to jerky.

The New World produced unique road food. The Inuit valued slices of bear and seal as high-energy meals for snowy journeys. In Argentina, Brazil, Chile, Peru, and Uruguay, meal sellers hyped the portability of jerky, which campers could boil in water for a hearty broth. The Canadian Huron relied on dried berries, corn, and sweet prairie turnips (*Psoralea esculenta*), an ingredient in fry bread.

Farther south, travel food derived from home gardens and from nature. California Indians preferred corn mush with grass seed or sunflower seeds. Desert wanderers cored saguaro cactus and chewed the cortex for moisture. Southwestern Indians carried corn in backpacks and tucked sacks of cornmeal in woven belts. European settlers of the Great Plains centered cookery on ashcake, johnnycake, mock oysters (corn fritters), and pone, all convenient corn foods for long passages. A simple kitchen staple, hush puppies (cornmeal fritters) paired with fried fatback in knapsacks and pockets and served children as snacks for long treks to and from school.

Luxury Travel

Pleasure travel became famous for exquisite cuisine. Europe's transcontinental rail line, the Simplon-Orient Express, ran for eight decades from central France to Constantinople, beginning in 1883 with a maiden passage from Paris to Varna, Bulgaria, then by steamer over the Black Sea to Constantinople. Preordered meals eaten from baskets or from the passengers' stores required only cutlery, glasses, napery, and tables from the rail stewards. In 1877, the Simplon-Orient company added a restaurant car, which drew a privileged clientele for the quality of its decor and five-star food service. Meals took on the glamour of top restaurants. Lunch consisted of partridge, fruit, a Turkish pumpkin dessert, chopped almonds in rose syrup, and Turkish coffee. At formal dinners, 42 passengers at a time shared space in the dining car for ten-course meals, beginning with soup and hors d'oeuvres and continuing with capon, goose liver, lobster in aspic, oysters, saddle of venison, smoked trout, truffles, turtle soup, and woodcock. Wait staff completed the meal with fresh vegetables, green salads, elaborate pastries, sorbets, cheese, and fruit baskets, all served with appropriate wines.



R.M.S. "TITANIC"

APRIL 14, 1912.

LUNCHEON.

CONSOMMÉ FERMIER COCKIE LEEKIE

FILLETS OF BRILL

EGG À L'ARGENTEUIL

CHICKEN À LA MARYLAND

CORNED BEEF, VEGETABLES, DUMPLINGS

FROM THE GRILL.

GRILLED MUTTON CHOPS

MASHED, FRIED & BAKED JACKET POTATOES

CUSTARD PUDDING

APPLE MERINGUE

PASTRY

BUFFET.

SALMON MAYONNAISE POTTED SHRIMPS

NORWEGIAN ANCHOVIES SOUSED HERRINGS

PLAIN & SMOKED SARDINES

ROAST BEEF

ROUND OF SPICED BEEF

VEAL & HAM PIE

VIRGINIA & CUMBERLAND HAM

BOLOGNA SAUSAGE BRAWN

GALANTINE OF CHICKEN

CORNED OX TONGUE

LETTUCE BEETROOT TOMATOES

CHEESE.

CHESHIRE, STILTON, GORGONZOLA, EDAM,

CAMEMBERT, ROQUEFORT, ST. IVEL.

CHEDDAR

iced draught Munich Lager Beer 3d. & 6d. a Tankard.

Travel food reached the pinnacle of luxury on the ill-fated maiden voyage of the RMS *Titanic* in 1912. As evidenced by this luncheon menu for April 14— the afternoon before the ship struck an iceberg and sank— even second-class passengers dined in high style. (*UniversalImagesGroup/ Getty Images*)

Combat halted the Orient Express route for five years during World War I, but the famed rail line resumed service in April 1919, carrying the wealthy and elite to spas and seasonal retreats at Belgrade, Calais, Lausanne, Sofia, Trieste, Venice, and Zagreb. By 1947, upgrades to service brought full kitchens, freezers, and a bakery, which turned out 100,000 pastries and cakes per month, and an upscale buffet. In the 1990s, the line served breakfast privately in cabins and maintained a bar car and dinner menu rivaling cruise ships.

Aboard the *Titanic*

One of culinary history's most momentous travelers' meals, the last dinner aboard the RMS *Titanic* served diners bound from Southampton, England, west to New York City. An Edwardian pantry required cargo loaders, crane operators, dockworkers, and stevedores to stow around 4,000 bales, bundles, and cases. The fresh items accompanying the maiden voyage of the *Titanic* consisted of a staggering quantity of the finest comestibles, including: 37.5 tons (34 metric tons) of meat, plus 12.5 tons (11.3 metric tons) of game and poultry and 3.75 tons (3.4 metric tons) of ham and bacon; 7.5 tons (6.8 metric tons) of fish, plus 305 gallons (1,154 liters) of oysters and 25 cases of sardines; 40 tons (36 metric tons) of potatoes; 5 tons (4.5 metric tons) of sugar; 3 tons (2.7 metric tons) of butter; 63 cases of champagne; and 1,000 bottles of wine. Brine-cooled refrigeration chilled beef chambers, cold lockers, and wine and beer caves. Two carbon dioxide machines churned out ice.

Lavish stocking of the pantries of the Ritz, the hotel-sized restaurant on B deck, met the expectations of moneyed passengers and the critical eye of manager Gaspare Luigi Gatti, who had formerly managed Oddening's Imperial Restaurant in London. First- and second-class passengers selected gourmet dishes from à la carte menus. Steerage class passengers, who traditionally had carried their own food and dishes aboard ocean liners, ate plain, but hearty porridge, beef with gravy, cheese, pickles, rice, smoked herring, and stewed figs, all prepared in a separate galley and served in the dining saloon on D deck.

The *Titanic*'s spacious cooking area featured an unprecedented array of worktables and utilities for preparing 60 recipes. Separate refrigeration units held

dairy items, eggs, fish, meat, fruit, and vegetables. Supervisors heading individual staffs labored at one specialty each— frozen desserts, kosher meals, pastry, roasting, salad, saucing, seafood, soup, and vegetables. Before dawn each day, workers prepared the day's specialties and readied dough for fresh breakfast buns and breads, managed by Walter Belford, the night baker.

The first-class luncheon for April 14, 1912, featured brill fillets, corned ox tongue, egg à l'Argenteuil, eight cheeses, galatine of chicken, Norwegian anchovies, potted shrimp, salmon mayonnaise, smoked sardines, soused herring, and the standard cruise highlight, a steamship round of roast beef carved to each diner's taste. The evening menu equaled a *table d'hôte* meal from a fine hotel: shrimp canapés and raw oysters in vodka with lemon and hot sauce consommé or barley soup; poached salmon with mousseline sauce; filet mignon with foie gras and black truffles or chicken lyonnaise or minted lamb, glazed roast duck or beef sirloin, served with potatoes; mint tea timbales, and creamed carrots; sorbet made from champagne, orange juice, and rum; roast squab on watercress; asparagus-champagne- saffron salad; chocolate eclairs, French vanilla ice cream or jellied peaches, and assorted fresh fruits and cheeses.

The *Titanic* sank at 2:20 a.m. on April 15, 1912, after striking an iceberg less than three hours earlier. Chief baker Charles John Joughin assigned his staff to stock each lifeboat with bread. Of the liner's staff of 685, only three galley employees survived. After the discovery of the submerged hull on September 1, 1985, survey crews reported that dishes and plates remained in meticulous stacks alongside pots and pans and unopened bottles of Monopole champagne, port, sherry, and Bordeaux, Burgundy, Mosel, and Rhine wine.

Luxury Air Service

In a class with spectacular ocean liners such as the *Titanic* and rail service aboard the Orient Express, the elegant airships of the 1930s expanded choices in transportation. Within five compartments, passengers enjoyed light in-flight refreshments, including grenadine and kirsch cocktails. By 1931, the spectacular *Graf Zeppelin* scheduled passenger Pacific flights from Japan to Los Angeles and an Atlantic itinerary across France and Spain, down the western coast of Africa,

and west to Recife de Pernambuco, Brazil. Although space was cramped, passengers dined well on a snack menu of cold cuts, chicken, and champagne. A dinner meal, created by the Los Angeles Biltmore Hotel and prepared on two hot plates and an electric oven, began with beef consommé and advanced to marrow dumplings, roast gosling, salmon, and after-dinner brandy, but no cigars.

On a new breed of faster, more commodious zeppelins in 1936, the *Hindenburg* offered bar service in a sealed, pressurized smoking lounge. Deck B housed a dumbwaiter that hoisted meals from the plating area to the serving pantry above. An after-lift-off supper of cold cuts, salads, and hot biscuits satisfied appetites on the departure from Frankfurt. For three daily meals and afternoon tea, the dirigible's crew loaded the galley with 800 eggs, 440 pounds (200 kilograms) of potatoes, 220 pounds (100 kilograms) of cheese and butter, and heaps of smoked meat, cheese wheels, and mineral water, superintended by Chef Xavier Maier, formerly of the Ritz Hotel in Paris. At a fare of \$405 one way, the airship promised contentment. The *Hindenburg's* menu offered fresh fruit, sausages, and hot buns at breakfast and a lunch of Westphalian ham and roast beef sandwiches. At dinner, passengers could choose sole, duckling, ham with asparagus, veal, or venison. A white-coated steward took orders for food and French and German wines and brought the first course, bowls of clear soup.

Beyond Earth

Space travel presented new challenges to meal planners and nutritionists. In 1998, the planning of the International Space Station (ISS) for low Earth orbit included food service for researchers and crew. Before takeoff, most of their meals arrived to the pantry canned, frozen, or refrigerated for maximum purity. Each occupant cooked packeted stores in the galley in two food warmers and rehydrated supplies with either cold or heated water. Plastic bags held drinks and soups for sipping through straws. A fork and a knife attached to each tray to prevent the utensils from floating away in zero gravity.

Laminated retort pouches retained sterility of varied dishes and drinks, including brownies, irradiated beef steak, granola bars, rice pilaf, scrambled eggs, and tortillas. Limitations on condiments reduced choices to ketchup, liquid salt,

mayonnaise, mustard, and pepper paste. In 2007, to appeal to Japanese engineer Koichi Wakata, provisioners added adzuki beans with wild greens, curry, egg soup, mackerel in miso, ramen, and rice balls, all available with green tea. When Korean astronaut Yi So-yeon joined the crew in April 2008, she brought *kimchi*, her country's national dish of fermented cabbage. Jewish Canadian engineer Gregory Errol Cham-itoff added sesame bagels. Russian fliers selected from black currant juice, borscht, curds, goulash, and jellied pike.

In July 2011, the last ISS mission departed aboard the shuttle *Atlantis*, the end of a 30-year space program. To stimulate space-inhibited appetites, celebrity chef Emeril Lagasse supplied the ISS pantry with jambalaya, mashed potatoes with bacon, green beans with garlic, and rice pudding. The space food developer explained that appetizing meals at the rate of 3.8 pounds (1.7 kilograms) per day raised morale and ensured wellness during extensive weightlessness. To ensure nutrition in future missions, space scientists experimented with kitchen gardening, producing cabbage, carrots, herbs, lettuce, onions, peppers, radishes, spinach, strawberries, and tomatoes.

See also: Animal Husbandry; Biscuit; Crackers; Dried Food; Hunter-Gatherers; Ibn Battuta; Jerky; Nomad Diet and Cuisine; Pemmican; Polo, Marco.

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[Tudor Diet and Cuisine](#)

From 1485 to 1603, an era of status-raising displays of pomp and wealth in

England, Tudor diet and cuisine verified the provider's ability to serve an elegant meal. Unusual demand raised urban food prices and stripped the countryside of its best produce. In April 1486, to relieve the treasury of costly state meals, King Henry VII went on an extended royal progress to Pontefract and York in the northern and western parts of his realm. According to the *Croyland Chronicle* (1486), the royal entourage placed the burden of feeding on social climbers and rural aristocrats seeking the prestige of serving the royal table.

For peace talks between Henry VIII of England and French King Francis I at the Field of the Cloth of Gold, near Calais, France, in June 1520, workers erected two red wine fountains. A brick oven produced bread for 12,000 attendees, all of whom had table rights to dine at the king's expense. Cooks distributed mutton from 2,200 sheep and served 70 jars of strawberry jam on 1,350 pastries. Gamekeepers contributed coney, geese, larks, pigeons, partridges, snipe, and woodcocks.

Hampton Court

Hampton Court Palace, a Thames-side estate in East Molesey, Surrey, remains the primary model of food service surviving from Tudor England. Its own er, chief minister Thomas Wolsey, the archbishop of York, doubled the floor plan to one of the three grandest courtier residences in England. For serving guests in the 45 apartments, the kitchen garden produced chicory, endive, fennel, mallow, purslane, rocket, and smallage (wild celery).

Until Wolsey's fall from favor in 1528, he treated guests to feasting on Dutch lettuce salad, the favorite of Queen Catherine of Aragon, first of the six wives of Henry VIII. A featured meat, turkey, newly imported from the New World in 1525, treated the discriminating English to a costly bird that came to the table plumper and juicier than pheasant. With knives and fingers, diners ate the gilded entrées, which chefs scented with lemons and Seville oranges, perhaps as a gesture to the queen's Iberian heritage. The use of citrus juices as flavorings appeared less fashionable after Catherine's replacement in the king's affections by Anne Boleyn in the late 1520s.

Food as Exhibition

When Henry VIII bought the Hampton Court palace in 1529, he further remodeled the property to house 1,200 people for grand entertaining. At its completion in March 1532, a wine fountain in Base Court spouted drink for holiday visitors. The complex included two butteries (bottlers), two dressers, saucery, larder, flesh larder for meat, dry larder, pastry office in charge of tarts and crusts, confectionery for making marzipan and gingerbread, chandlery, spicery, and two plating counters. On the main kitchen wall, a brick shelf with grates above charcoal burners reduced the size of fires needed for individual dishes.

At one end of the great kitchen, a hearth five times the size of a sitting room fireplace held a giant cauldron and spits for roasting whole oxen. Behind a screen, one of a crew of seven spit boys sat at a four-legged stool away from direct heat to rotate and baste roasting meats with pan drippings and piquant sauces and gravies made from bone marrow, ginger, and wine. For beverages, the estate offered a privy cellar to serve the royal table. For guests, butlers drew on a drinking house for storing leather ale jugs and a three-stage wine cellar holding the annual reserve of 300 barrels imported from Burgundy and the Rhinelands.

For fiscal supervision, the Board of the Greencloth, administrators of the kitchens and pantry, checked in deliveries of candles, charcoal, rushes for strewing the floors, and spice, the costliest food outlay. Provisioners limited wheat to the high-quality grain harvested on the king's farmlands for baking soft cheat (loaf bread) and manchet (soft rolls). A wet larder stored saltwater fish in barrels of seaweed; fresh water bream and carp remained live in the palace moats and ponds until removed for cleaning and cooking.

Staffing Extravaganza

At Henry's new Great Hall, ser vice to England's royalty and aristocrats required a lord steward to look after the pantry and food ser vice. In addition to the great kitchen adjacent to the main hall, the designer established larders beyond the kitchen, a confectionery within the confines, and a pastry house and poultry scalding and plucking area outside the walls as a precaution against fire and odor.

The kitchen brigade, which had access to the nation's first printed cookbook, *A Noble Booke of Cookery for a Pryncis House hold* (ca. 1500), outlined impressive menus for meals at 7 a.m., 10 a.m., and 4 p.m., plus a late-night snack after 8 p.m. Both the king and queen engaged personal cooks Pero Doux served the king as master chef; head cook John Bricket prepared house hold meals.

For maximum temperature control of dishes, the serving counters lay within easy walk to the high table and to the watching chamber, where officials ate. In the kitchen wall at a hatch resembling a modern restaurant service window, servants collected hot food for groups of four to share, including cooked salad ingredients dressed with oil, red wine, and sugar. Bread and drink came up the back stairs from the buttery and cellars below the main hall.

For private meals, Henry VIII had a separate kitchen near his quarters. His daughter, Elizabeth I, preferred even stricter privacy at mealtime. She chose to share any untouched entrées with her ladies in waiting.

Royal Diet

Meat comprised 75 percent of palace cuisine, which reached as high as 5,000 calories per day. In one year, the staff cleaned, dressed, cooked, and served 8,200 sheep, 2,330 deer, 1,870 pigs, 1,240 oxen, 760 calves, and 53 wild boar. Most came from the royal estates or from local farms and markets. During Lent and on Christmas, Easter, Ascension, Assumption, Midsummer, and other fast days, the staple dish consisted of salt kippered herring, pickled and smoked, or fresh fish and eels, some sold by local fishermen. In 1541, Henry abandoned 70 percent of holy fast days. He abolished absolute fasting by increasing ingredient choices to include dairy items and eggs on Lenten menus.

After the death of King Edward VI in 1553, his half sister, Mary I, reverted to Catholic food customs and upheld fast days to shield the fish industry from financial ruin. Entrées continued to feature fish each Friday and Saturday. Cooks baked, boiled, fried, and grilled a variety of species, from ordinary cod and dace to crayfish, ling, loach, sturgeon, and whale. Leftovers passed to the wait staff and kitchen help; their leavings went to beggars.

During the 45-year reign of Elizabeth I (1558– 1603), she more than tripled

house hold bud gets from her father's £16,000 to £55,000. State dinners for as many as 600 required two sittings, constituting the first separation of the dining chamber from food service in European history. The lord steward organized a liveried staff of 200 men consisting of a master chef, 12 sous-chefs, 12 cook's aides, and a serjeant of the cellar, William Abbott, with a staff of ten for each subsidiary kitchen.

High Renaissance menus departed from the heavy black puddings and meat haunches of early Tudor times in favor of more delicate recipes. They grilled birds and steaks flavored with healthful broths, coriander, lemon, mint, parsley, and wine. At the queen's direction, cane sugar, once imported from the West Indies as a curative, sweetened vegetables, meats, and desserts. Pastry chefs decked elaborate display pieces with candied violets, fruit paste, ginger crystals, gold leaf, licorice, marmalade, and rosewater.

Commoner's Food

While Elizabeth imported Flemish gooseberries for pies and anchovies, artichokes, asparagus, capers, fish egg relish, and Greek olives from the Mediterranean, the gentry imitated her example by arranging for intimate gourmet dinners cooked by their French chefs. An expensive paste, blanchmange involved shredding chicken for mixing with almond milk, rice, and sugar. Baskets of manchet established the status of any family that could afford fine white flour, which bakers sifted and resifted through fine linen.

In contrast to aristocrats and the upwardly mobile, who could afford New World kidney beans in tomato sauce, spiced pumpkin soufflé, and sweet potatoes boiled in wine, peasants relied on staid English fare. The poorest of England's 4 million subjects fed on maslin (brown bread) or horse bread, barnyard loaves made from ground dried peas. They raised sheep for milk and mutton, which they ate from common plates or trenchers, thick bread slices the size of a platter for soaking up gravy. As a side dish for venison, a grain pudding called frumenty, either homemade or purchased from a cookshop, combined almond milk and egg yolks. Cooks surrounded bacon with pureed beans to absorb the excess salt that preserved pork. Both adults and children drank ale and beer. In Ireland, where

cuisine standards suffered, crude cookery of boiled cabbage with mutton and pork entrails relied on cowhides for pots and straw for strainers.

Stale bread undergirded the simplest recipes. A common sauce, *cameline*, resembling the napped surface of camel hair, consisted of bread crumbs, nuts, and raisins blended with cinnamon, cloves, ginger, and vinegar. In the 1590s, when harvests disappointed farmers, strapped rural families stretched Scandinavian or Russian stockfish and boiled meat by grinding them into *mortrews* (mortared stew), a paste thickened with bread crumbs and eggs and flavored with inexpensive bay salt.

By autumn 1596, food riots threatened in Oxford-shire. The poor, who lived in wattle and daub huts, had no oven and only a cauldron for cooking one-pot meals. The most common dish, that of the landless carter or drover, depended on pottage or vegetables boiled in barley or oat grain with mustard and vinegar as condiments. The pickling of surplus vegetables required verjuice, a vinegar pressed from rotted crab apples. To escape malnutrition, desperate people worked as apprentices or in great houses as servants and wet nurses, both of whom received adequate meals. In 1601, passage of the Elizabeth Poor Law set an almoner over parish food relief for poor houses in England and Wales.

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[Tull, Jethro \(1674–1741\)](#)

An English experimental agronomist and amateur engineer, Jethro Tull invented a seed drill and plow that modernized agriculture.

Born in Basildon, Berkshire, Tull studied law at Oxford University and Gray's

Inn until pulmonary disease ended his career plans. After marriage, at age 25, he joined his father in farming the chalky, unpromising fields at Howbery near Wallingford and northwest of London. Costs and operational waste frustrated Tull from the outset. In 1701, to prevent the waste of seeds in the process of broadcasting them at random and leaving them on the surface for birds to peck, he invented a hopper and cylinder that turned against a spring-loaded tongue to plant sanfoin, a French pasture grass. He dubbed the mechanized method the “vineyard technique.” By directing seeds through grooves into a funnel, the device regulated distribution along three rows at a time. The placement of beans and peas at controlled intervals and depths preceded covering with soil by a harrow, to leave space for tillage.

Two years after settling on Prosperous Farm at Hungerford, Oxford, Tull advanced from gentleman farmer to innovator. He promoted the use of the horse to replace oxen as draft animals. He championed innovation and adapted his drill for the planting of potatoes and turnips, two food crops gaining primacy in Europe. Although his employees rebelled and covertly sabotaged his equipment, he earned regard for growing wheat 13 seasons in the same field without adding manure. In 1713, he toured the vineyards of France and Italy to study Continental farming methods. The following year, he upgraded his planting mechanism to stir the soil more thoroughly. With the aid of three plowwrights, Tull engineered a four-coultured disc plow, which cut into sod. The moldboard plow, an experimental soil breaker, overturned weeds and left their roots to dry in the sun. He also invented a horse-drawn hoe for pulverizing dirt clods to release minerals into wheat and forage plants. The system reduced irrigation and seed costs as well as the labor of sowing and weeding. Tull joined a farming cooperative that founded the Norfolk system, a scientific approach to planting and cultivation by replacing fallow farming (allowing fields with depleted soil to lie fallow) with the soil enrichment of clover and turnips. Tull’s treatise, *The New Horse-Hoeing Husbandry* (1731), proposed contour plowing to form terraces to catch water runoff and theorized that the use of manure as fertilizer caused a bad taste in vegetables.

Although the Tullian system won approval in Scotland and the advocacy of philosopher Adam Smith, English critics initially charged row cropping with wasting strips of land between furrows. A virulent critic, editor Stephen Switzer

denigrated Tull's concepts by issuing a monthly journal, *Practical Husbandman and Planter* (1733– 1774), which charged Tull with undermining the classical methods taught in Virgil's *Georgics*. Nonetheless, Tull's work remained a touchstone of modern agriculture and passed through five editions. He published an expanded version in 1733, a supplement in 1735, addenda in 1738, and a conclusion the following year, all aimed at the interests of aristocratic landowners. The introduction of soil fertility methods broke the dung-fodder cycle, by which farmers had grown more fodder to feed more stock to make more manure. A 1750 translation by Henri-Louis Duhamel du Monceau introduced Tull's farming concepts at experimental fields in France and won encyclopedist Denis Diderot and philosopher Voltaire to Tullian methods. In 1759, distribution of the English version of Duhamel's six-volume *Traité de la Culture des Terres Suivant les Principes de M. Tull* (*Treatise on Agriculture according to the Principles of Jethro Tull*, 1756) revived interest in Tull's farming methods. Despite a resurgence of agrarian disputation for the next 15 years, historians acclaimed Tull as the "Father of British Agriculture" and originator of the "New Husbandry."

The fifth edition of Tull's work, completed by Aaron Brachfeld and Mary Choate in 2010, defended Tull's reputation from period charges that he generated unemployment of farm laborers and depressed wages by industrializing agriculture. The text recommended turnips, a recent addition to English farms for intercropping with barley, oats, and wheat. Instead of importing low-calorie fruits and vegetables from the Continent, the fifth edition proposed that the English boost nutrition and health by growing their own. The editors promoted a balanced diet, including beans and whole grains, the basis of an antitoxic diet that included cranberries, kelp, and thistle.

See also: Agriculture; Beans and Legumes; Eliot, Jared; Wheat.

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V

Vanilla

A sultry, intoxicating aroma and flavor associated with chocolate, vanilla derives from a succulent tropical vine native to Mesoamerica. The dried bean entered world cuisine in the Totonac diet of Veracruz in Mexico's Valley of Mazantla, a volcanic crater, long before the Spanish conquest in the early sixteenth century. Purists credited the flavor of Mexican vanilla to terroir, the complex ecology of climate and soil. The vine flourished in the Gulf Coast jungle understory of *cocuite* and *pichoco* trees.

In Belize, the Maya interplanted vines with amaranth, corn, tomatillos, and tomatoes and harvested vanilla beans for trade. Cooks toasted pods on a *comal* (flat clay or cast-iron griddle) and cooked crushed beans in bread pudding and stewed squash or pumpkin. In Brazil, Ecuador, Guiana, Honduras, and Peru, an inferior species produced a coarser scent and taste valued mainly by the perfume industry.

After the Aztec king Itzcoatl overthrew the Totonac in 1427, the conquerors levied a vanilla bean tax. When Hernán de Cortés first observed the Aztec diet on November 14, 1519, Emperor Montezuma II consumed countless cups of hot chocolate flavored with honey and the vanilla bean (*Vanilla planifolia*), a revered neurological stimulant and aphrodisiac. By 1700, introduction of vanilla in European coffee, confections, medicinal powders and tinctures, luxury sauces, and tobacco jolted Mexican farmers to monetary success. In 1789, Thomas Jefferson, the U.S. envoy to France, brought home to Monticello enough vanilla beans to flavor ice cream, rice pudding, and syrups.

At the end of a boom in cacao markets, vanilleries gained investors hoping to profit from New World flora. Planters of the vanilla vine in other humid climes failed to connect the centrality of hummingbirds and the Melipona bee to the pollination of flowers. Javanese planters in Krawang and Preanger were the first to try—and fail—to rival the Mexican bean; German colonists made another

attempt in East Africa. By emulating bee action, Belgian horticulturist Charles François Antoine Morren broke the impasse in 1837 by introducing artificial propagation in French colonies.

Indonesia and Madagascar entered the vanilla market after 1841, when a 12-year-old slave, Edmond Albius of Réunion, pioneered hand pollination by smearing pollen from anther to stigma with a bamboo sliver. Fields of vanilla cuttings, cultivated by black slaves and laborers imported from China and India, required tree trunks or crutch-shaped stands to lift vines and beans into sunlight. Harvesting occurred one bean at a time when the green sheath split and the pod pulled free of its stem. Curing began with blanching in hot water and sun-drying. The yield hovered at 1 pound (0.45 kilogram) of dried vanilla from 4 pounds (1.8 kilograms) of beans. Workers, overwhelmed by the intoxicating scent, suffered an illness known as vanillism, manifested in headache, hives, and malaise.

For farmers in the Comoros Islands, Madagascar, and Réunion, experimental pollination increased observation time and field labor. The work was worth the effort because it boosted profits from the world's second-most-expensive flavoring after saffron. In 1850, the first liquid vanilla extract, made by chemist Joseph Burnett, traveled from Paris to Boston and gained fame among New York chefs for its vibrance. Additional vanilla plantations thrived in Australia, Costa Rica, Fiji, Guadeloupe, Guatemala, India, Jamaica, New Guinea, Sri Lanka, Tonga, Uganda, and Vanuatu. Prices fluctuated according to yield during cyclone season in the Indian Ocean and around French Polynesia.

Pure vanilla, the only fruit produced by an orchid, remained popular as a flavoring for ice cream, liqueurs, soft drinks, and sweets as well as in medicines. In 1858, Nicolas-Theodore Gobley first isolated the source of the bean's sweetness and complex fragrance, which derives from 171 aromatic compounds. In 1874, industrial chemists at Haarmann & Reimer in Holzminden, Germany, synthesized the flavoring from pine bark and clove oil, thus threatening the primacy of Madagascar as the world's top vanilla producer. Two decades later, the French firm of Rhone-Poulenc Pharmaceuticals competed with German synthesizers.

In the 1990s, high prices influenced the Costa Rican government to introduce vanilla propagation in the rural communities of Puerto Jimenez and Quepos. After weathering viral infection and a hurricane, planters in 2000 began marketing oversized pods, with premium-grade beans reaching 11 inches (28

centimeters). Mexican farmers ruined their reputation for quality by mixing vanilla with coumarin, a carcinogen derived from tonka beans that endangers the kidneys and liver. As a result, Indian planters in Karnataka, Kerala, and Tamil Nadu moved

[Recipe: Chocolate-Vanilla Pie](#)

Bake a pie shell and set aside to cool. Stir 1 cup of sour cream into 2 cups of water and whisk until the liquid thickens. In the top of a double boiler, combine the slurry with the powdered mix of a 5-ounce carton of dark chocolate pudding (not instant). Turn the heat on low and continue stirring. Add one 4.4 ounce (125 grams) Lindt dark chocolate bar, coarsely chopped, plus 2 teaspoons of pure vanilla extract and 1 tablespoon each of butter and espresso coffee powder. Continue cooking and stirring until the chocolate bar has melted and the filling is a smooth consistency. Pour into the pie shell and cool. Garnish with chocolate curls and mint leaves.

into first place with 16 tons (14.5 metric tons) of premium quality beans by 2002, outselling Madagascar's harvests. Mexican productivity dropped to 5 percent of the global vanilla market, which reached a height of demand in Australia, Canada, France, Germany, and Japan. From 2004 to 2010, prices fell from \$500 per kilo to \$20, the result of competition from vanillin, an imitation taste synthesized from an aldehyde used in 95 percent of the world's vanilla flavoring.

See also: Biscuit; Blenders and Food Processors; Chocolate; Green house Horticulture; Mail-Order Food; Polynesian Diet and Cuisine.

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Veganism

An avoidance of animal products in the diet, veganism professes a respect for animals and a desire to nourish the body on micronutrients from fruits, nuts, and vegetables. The concept of passive resistance to violence dates to the meatless diet of sixth-century B.C.E. Greek Orphism and Pythagoreanism and to Jainism, an Indian religion that abhors the exploitation of animals and violence to any living being. Strict observers thus reject factory farming and cleaning products and cosmetics tested on animals. The vegan regimen excludes, among other items, gelatin, honey and beeswax, fur and leather, silk and wool clothing, and carmine, the red dye in cider and chewing gum derived from the *Dactylopius coccus*, an insect that infests the opuntia cactus in Central and North America.

In 1944, English reformer Donald Watson coined the term *vegan* to describe nonmeat eaters who also reject dairy foods and eggs. Notable vegans have included Renaissance polymath Leonardo da Vinci, Transcendentalist educator Bronson Alcott, pop singers k.d. lang and Sinéad O'Connor, actors Brad Pitt and Sandra Oh, writer and feminist Alice Walker, civil rights activist Coretta Scott King, pacifist author Brigid Brophy, Vietnamese Zen monk Thich Nhat Hanh, and César Chávez, founder of the first migrant labor union in the United States. Carol J. Adams, an animal rights advocate, issued the bibles of vegans, *The Sexual Politics of Meat* (1990) and *The Pornography of Meat* (2004), which blame detachment from animal slaughter for promoting a meat diet. She and other vegans blame meat diets for damaging and consuming Earth's resources.



A member of People for the Ethical Treatment of Animals (PETA) rallies the public to adopt a vegan diet and lifestyle. Vegans avoid the consumption of animal products for ethical and environmental reasons as well as for personal health. (*Vincent Thian/Associated Press*)

The popularity of cruelty-free eating increased in 2009 after the American Dietetic Association found the vegan diet to be low in fat, high in fiber, and suitable to virtually all periods and activities in human life, including infancy, pregnancy and lactation, and professional athletics. Vegan cooking involves substitutions for standard ingredients—nondairy butter (replacing butter), soy or almond milk and coconut cream (cow’s milk), tofu (eggs), applesauce (honey), and vegetable broth (meat-based broth).

Followers of the plan avoid food-borne bacteria from livestock—campylobacter, *Escherichia coli* (*E. coli*), listeria, mad cow disease, and salmonella, all sources of illness that can kill. Vegans also experience fewer incidents of arthritis, cancer, coronary disease, diabetes, hypertension, obesity, and osteoporosis, though they risk iron-deficiency anemia and insufficient intake of vitamins D and B12.

A more stringent vegan diet consists only of raw foods, primarily fresh beans, grains, fruits, nut pastes and seeds, plant oils, sea and land vegetables, sprouts, and juices made from such ingredients. Another meatless variant, macrobiotics, stresses whole grains and limits consumption of avocados, beets, eggplant, peppers, potatoes, spinach, and tomatoes. A similar regimen, the Edenic diet follows the book of Genesis by excluding all meat and shellfish, salt and spice, sugar, coffee and tea, and alcohol.

See also: Child, Julia; Fructarianism; Gourmet Cuisine; Kitchen Lore; Raw Cuisine; Vegetarianism.

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Vegetarianism

The avoidance of animal products in the diet, called vegetarianism, aims to improve health and increase longevity through the avoidance of ingesting animal blood, marrow, and fatty muscle tissue.

The concept made its impact on human history after the second great food revolution. The first, at the end of the Paleolithic age, turned weapon-making omnivores to carnivores when hunters realized they could bring down large mammals for food with clubs, spears, darts, pits, deadfalls, axes, hooks, knives, nets, and poison. The former diet, based on foraging for plants and mollusks and

snaring birds and small animals, gave place to a daily intake of large haunches of meat. Much of the world's diet

Types of Vegetarians

Type	Diet
Buddhist vegetarians	no animal products, garlic, or onions
fructarians	fruit, nuts, and seeds
granivores	grain and seed
herbivores	plants
lactarians	plants and dairy food
liquidarians	plant juices
macrobiotic vegetarians	primarily beans and whole grains
modified vegetarians	no flesh and no fowl that eat fish
ovo-lactarians	plants, eggs, and dairy food
ovo-vegetarians	plants and eggs
pescetarians	plants and fish
pollotarians	plants and poultry
pollo-pescatarians	plants and white meats
raw vegans	fresh fruit, nuts, seeds, and vegetables
semi-vegetarians	plants, no mammal meat
vegans	plants, no dairy, eggs, or honey
vegetarians	no fish, flesh, or fowl
vitarianism	fruit, raw milk products, and vegetables

still centers on sizable mammals cooked into meat dishes. However, despite the shift from wild greens to meat, vegetarians insist that meat avoidance is more natural to human anatomy, which lacks the carnivore's powerful jaws and the short gut associated with rapid digestion of animal protein.

A major shift from a carnivore diet to grains and legumes occurred with the beginning of agrarianism. Lentils, a high-protein Stone Age crop, entered the human diet in 9500 B.C.E. in southeastern Turkey, followed in 9000 B.C.E. by the harvesting of wild einkorn wheat. By cultivating grains and other feed crops,

growers could raise domesticated livestock and poultry and also supply a vegetarian diet. Globally, meat eaters dominated Europe; vegetable eaters settled most of Asia.

The Pious Diet

Vegetarianism prevailed in controversies among Asian theologians. Although there is no proof that Buddha was a vegetarian, the abstemious Buddhists of Tibet ate animals only if beasts accidentally died or other beasts slaughtered them. As early as 2000 B.C.E., Aryan Hindus set harsh strictures against cattle slaughter. The *Atharvaveda* (ca. 800 B.C.E.), a normative guidebook attributed to the mythic sage Atharvan, a son of Brahma, specified that only Brahmins could sacrifice a cow to the gods as a holy offering. Peasant esthetics gradually supplanted the burning of haunches of meat with flowers, fruit, incense, oil, and vegetables, all more easily attainable and less wasteful of herd animals.

Buddhist, Hindu, and Jainist scripture set the tone and style of the peasant diet. Around 800 B.C.E., the Baudhayana Sutra, a collection of manuals on behavior, warned the devout to keep silent, sit with crossed legs each night, and eat sparingly of barley, dairy products, oil cake, and rice. In a travelogue issued around 415 C.E., Fa Xian, a Chinese Buddhist monk who toured Nepal, India, and Ceylon, condemned the herding and breeding of domestic animals as a sinful abuse of creation prefacing slaughter and meat eating.

Concurrently, Jainism, a pacifist sect originating in northwestern India, evolved dietary monastic vows. Laws in the Anga kingdom of eastern India (ca. 450 B.C.E.) required nonviolence to people and animals, cyclical fasts, and the eating of “innocent” food. Jain kitchen rules for monks and laypersons exceeded even the severity of orthodox Hinduism. Jain cuisine authorized the eating of ginger and other rhizomes but declared the harvesting of root crops a form of killing.

Gradually, Jainist, Hindu, and Buddhist abstinence from violence won out over ritual killings. Buddhism became less dogmatic than Hinduism or Jainism. For the sake of health, Buddhist monasticism advised the teacher to avoid intoxication and health-threatening seven-day fasts from meat, salt, and grains.

Abstinence from meat was not obligatory until the third century B.C.E. At Bihar, in northeastern India, Ashoka the Great, the Mauryan emperor (r. ca. 270–232 B.C.E.) and patron of Buddhists, ordered his subjects to refrain from harming animals and to revere an all-vegetable diet for themselves and for feeding their flocks. In Gujarat, Ashoka's first command incised on the Girnar Edict Stones forbade the type of widespread animal slaughter that once preceded kingly feasts. In response, Buddhists banned meat from their kitchens and avoided contact with butchers and fishermen.

Subsequent Hindu law held it a crime in the food industry to kill, butcher, buy, sell, cook, or eat animal flesh. For sacramental gifts, the devout purchased milk products rather than meat. A passage in the *Mahabharata* (ca. 200 B.C.E.), the Indian epic, warned that violators would rot in hell for the number of years equal to the hairs on the slaughtered beast. Another entry promised sound memory, beauty, health, and longevity plus strong character and spirituality to vegetarians.

Jews, Christians, and Confucians

Judaism systematized meat slaughter, food purchase, kitchen cleanliness, and cookery but did not require vegetarianism. As illustrated in Genesis, Jehovah created humankind—Adam and Eve—as vegetarians or possibly fructarians. Their holistic diet reflected nonviolence and a perfect harmony with nature, symbolized by residence in the Garden of Eden, the meta phoric “Peaceable Kingdom.” The mythic first couple remained fructarian or vegetarian until after their expulsion from paradise for violating a dietary constraint. Under a concession from the divine creator, Noah and his family became the first followers of Yahweh to kill animals for food. Based on biblical example, the Hebrews, unlike the Babylonians, hunted no animals with weapons and fished only with large nets, never spears.

According to Josephus's *Antiquities* (94 C.E.), the first-century Essenes embraced vegetarians and centered communal dining on bread loaves, the focus of the Eucharist. Other early Christians preferred fish to meat because of the symbolism of the Greek anagram *Ichthus* (fish) for “Jesus Christ, Son of God, Savior.” By popularizing fish entrées, Christ cults eroded classical Greek

vegetarianism.

The meatless diet held a minor role in the Chinese Taoist cult, which sanctioned only vegetarian gifts to honor dead ancestors. The source of chi (energy or life force), some cultists declared, derived from the cypress or pine tree and peaches. Taoist proto-pharmacist Ge Hong (Ko Hung), who lived near Nanjing, compiled a philosophical text called *Pao-p'u Tzu* (*The Master Who Embraces Simplicity*, ca. 317 C.E.) that advised on lifestyle. The text blended Confucius's ethics with Taoist metaphysics, including charms, magic recipes made from crane eggs and tortoise shell, and the "elixir vitae," the tonic of life. To earn extra days of life, his followers practiced self-control and sexual continence but abandoned reliance on herbalism, which incorporated toxic plants. The neo-Taoist strand eventually abandoned its narrow regimen to follow a healthful lifestyle based on earthly contentment and the hope of heaven. The reshaping of Taoism took another direction in 415 C.E., when Kou Qianzhi (K'ou Ch'ien-Chih) reformed the creed by removing the extremes of breath control and sexual ritual and taxes to support the priesthood. With the aid of Emperor Tai Wudi (T'ai Wu Ti), Kou reestablished the faith as a state religion, a decree that remained in force until 448 C.E., when northern schismatics reinstated the cult of longevity based on medicine, herbs, and vegetarianism.

In the late third century C.E., Porphyry of Lebanon, a Neoplatonist philosopher educated in Athens, vigorously opposed human consumption of animal flesh by warring with ancient dietary theorists. His writings lauded the vegetarianism of Pythagoras, the Samian philosopher of the late 500s B.C.E. who refused to eat meat on the grounds that departed human spirits transmigrate to animal form. A soulful nature lover, Porphyry justified a vegetable diet in *De Abstinentia* (*On Abstinence from Animal Food*, ca. 275 C.E.) on the basis of his compassion for animals, which he described as sensitive to human anger and cruelty. He forbade bloody sacrifices to God. His ideals refuted those of Roman philosopher Aulus Cornelius Celsus, author of *De Medicina* (*On Medicine*, ca. 15 C.E.), who promoted a diet of bread and meat over vegetables and fruit because he believed that human physical structure called for analogous tissue from animal torsos and limbs. In agreement with Porphyry, the eleventh-century medical school dietary guide *Regimen Sanitatis Salerni* (*Healthy Salernian Diet*) treated depression with dairy products and fresh fruit and an avoidance of red meat.

Early Medieval Vegetarianism

Into the Middle Ages, church fathers condemned a meat-and wine-rich cuisine for its association with wealth, prominence, and the tormenting of beasts. In the third century, Clement of Alexandria and Tertullian opposed consumption of animals as evidence of carnal lust. After concurrence by Saint Jerome and Saint John Chrysostom in the next century, the monastic hierarchy evolved rules concerning what foods to proscribe. The fount of Christian hospitality, Saint Benedict the Great of Nursia, Italy, author of *Regula Monachorum* (*Rules for Monks*, ca. 515), excluded four-footed animals from allowable cuisine for monks but made no comment on the substitution of birds or fish for meat. He based his ideal of a noncarnivorous, nonalcoholic diet on a belief that costly red meats and wines violated vows of poverty and encouraged sexual debauchery. On meatless days, monks ate fish, frogs and other water creatures, eggs, snails, and the tender unborn fetuses of rabbits, which had not yet become meat.

From the Monastery of Saint Denis, France, twelfth-century scholar and teacher Pierre Abélard urged a similar restraint in his wife, Héloïse, a Benedictine nun and abbess at Argenteuil. Around 1135, she refuted his assertion that women might be sexually aroused from meat in the diet but yielded to his antimeat stance by formulating statutes basing diet on vegetables and grain.

In subsequent centuries, the heretical Cathars of Languedoc forbade the carnal corruption that they believed was caused by consumption of meat, eggs, cheese, and milk, all foods produced by animal coition and containing a soul. Some extremists rejected honey as another

[Recipe: Snail-Stuffed Mushrooms](#)

Cap two dozen large white mushrooms. Stir-fry for one minute in oil and cool. Mince the mushroom stems and one small onion and sauté in oil. Fold in one beaten egg, 1 tablespoon of chopped chervil or parsley, 1 tablespoon of chopped tarragon, 2 tablespoons of white wine, and a handful of toasted breadcrumbs. Fill each mushroom cap with a snail and top with the seasoned stuffing. Broil and serve with a sprinkle of vinegar and sea salt.

form of animal food. Out of a misunderstanding of the reproduction of fish, Cathar regulations allowed the cooking of swimming creatures as animals created by spontaneous generation.

Meatlessness in the Late Middle Ages

As monastic discipline eroded, monks who once served butchered meat only to invalids extended the privilege to all infirmary patients. Cistercians followed a rule of 1240, which allowed monastery kitchens to prepare no meat except for the sick and workmen. Even though the Decretals (church laws, 1234) by Pope Gregory IX forbade meat entrées, abbeys created a dispensation between infirmary and refectory that sanctioned meat on the table. In 1335, Pope Benedict XII relented because he could not enforce the prohibition of meat. He conceded that monks could serve meat up to four times a week except during holy fast days. As a control on excess, he allowed only half the brotherhood to abandon vegetarianism. Monastic cooks at Kirkstall Abbey in Leeds, England, prepared meat in a separate hall, the misericord, and later in a two-story refectory, with meat *ser vice* allowed only on the lower level and vegetarian entrées served upstairs.

During the Nara era of the eighth century, when Japan turned to Buddhism, citizens embraced vegetarianism and abstained from consuming oxen or horses, which they revered as dray animals, helpers of humanity. In place of mammals in the diet, the Japa nese cultivated their national staple, rice, along with barley, beans, millet, and sorghum. In the twelfth century, Zen Buddhist records introduced tofu, a soybean curd that simulated meat in cooked dishes. Around 1600, Jesuit proselytizer Matteo Ricci, an Italian missionary to Nanking, lambasted Buddhist asceticism as pagan, but his harsh dictum failed to halt Zen extremes of self-denial.

Over time, the sustenance of religious groups varied according to broad or narrow interpretations of scripture, canon law, and local practice. Japanese clergy ignored the past norm of Buddhist monks and nuns and ate meat. Thai brothers of the Thammayut sect rejected meat; the pragmatic Mahanikai brotherhood accepted meat when almsgivers offered it. Tibetan monasteries allowed meat in

the diet according to the dictates of the individual conscience. Chinese Buddhists cooked only vegetables in home kitchens, in part because of the Confucian ideal—a parallel to classical Greek Pythagoreanism—that an animal may be a reincarnated human soul.

Influential Vegetarians

Because of persuasive dietary guidebooks, numerous philosophers and wellness authorities have applauded the vegetarian diet, either as a life's regimen or as a temporary measure to restore health. Syrian theologian Gregory Bar Hebraeus, author of a philosophical encyclopedia, *Hewath Hekmetha (The Cream of Science)*, ca. 1285), covered issues of fasting and vegetarianism. He admired both the anchorite who limited himself to bread, salt, and water and the monk who ate dairy products, eggs, and fish. Reformer Thomas Moffett, author of *Health Improvement; or, Rules Comprizing and Discovering the Nature, Method, and Manner of Preparing All Sorts of Food Used in This Nation* (1655), warned that diners dug their graves with their teeth when they ate meat.

From a humane perspective, artist Leonardo da Vinci; philosopher Ralph Waldo Emerson; reform leader Mohandas Gandhi; Sylvester Graham, inventor of the graham cracker; and playwright George Bernard Shaw hated meat because it caused the deaths of mammals, which shared awareness and sensation with humankind. English nutritionist Thomas Tryon, author of *The Way to Health, Long Life and Happiness* (1683), wrote so persuasively on vegetarianism that he influenced American statesman Benjamin Franklin to give up meat temporarily. Franklin observed a meatless diet until age 17. While traveling by boat from Boston to Philadelphia, he observed the cook cleaning fresh fish and frying them for passengers. Franklin noted that the larger fish had a smaller one in its belly. Reflecting on nature's method of feeding larger animals on smaller ones, he abandoned vegetarianism as contrary to nature.

During the colonial era, Europeans in India observed the privilege of the Brahmin class, which followed a vegetarian diet. In his travelogue *Travels of a Philosopher: or, Observations on the Manners and Arts of Various Nations in Africa and Asia* (1770), Pierre Poivre, a botanist and biopirate, studied the effects

of vegetarianism on the Indian subcontinent. He described the Hindus of Malabar in southwestern India as pacifists and eaters of butter, fruit, and grain and pulses, but nothing that enjoyed an animal life. He approved nursing mothers feeding infants spoonfuls of sesame oil and admired particularly the vining Chinese spinach and orchards of bananas, cocoa, guavas, and mango as sources of wholesome produce. Publications spread Asian concepts, including the *Health Journal*, issued in 1842 by Mary Gove Nichols and Henry Wright, and, the following year, the British publication *The Healthian*, edited by Wright.

Fad Turned Lifestyle

On September 30, 1847, when English abstainers formed the Vegetarian Society at Ramsgate, they formalized the term *vegetarianism* to encompass all life deliberately sustained without meat consumption. The following year, they offered advice in their magazine, *The Vegetarian*. In 1908, other national antimeat societies formed the International Vegetarian Union in Dresden, Germany.

One proponent, Russian novelist Leo Tolstoy, became an ascetic in his declining years, promoting meatless eating among Russian intellectuals as a moral issue. In his opinion, the overall perfection of individual morality naturally resulted in vegetarianism. Attracted to nonviolence and animal rights, Tolstoy praised all-vegetable cookery as an adjunct to health. He deliberately isolated himself from meat preparers to cook and eat *kasha*, a Russian cereal that linked him with peasants.

In the United States, reform movements touched on the meatless diet as a key to health. William A. Alcott, a respected Boston physician and teacher, proclaimed the vegetable diet the basis of social reform. In June 1843, his cousin, idealist Amos Bronson Alcott, and English reformer Charles Lane founded a vegetarian retreat, Fruit-lands, a transcendentalist “new Eden” on a 90-acre (36-hectare) parcel at Harvard, Massachusetts. The experiment collapsed in January 1844 from lack of interest in an austere vegan regimen that also rejected eggs and dairy products from communal kitchens. Alcott’s contemporary, New York newspaper editor Horace Greeley, hosted a vegetarian banquet and welcomed such dignitaries as feminists Susan B. Anthony, Amelia Bloomer, and Lucy Stone.

In 1850, William Alcott zealously toasted the initial session of the American Vegetarians Society as the promotion of an ideal undergirding all civil, moral, religious, and social betterment.

The mid-nineteenth century brought a mass swing toward vegetarianism in the United States and Europe. Meatless and antimeat cookbooks abounded, many from California, the kitchen garden of America. Educator and domestic expert Catharine Beecher's *Domestic Receipt-Book: Designed as a Supplement to Her Treatise on Domestic Economy* (1846) raised an objection to animal fat, which she labeled the home's most injurious food. Christian reformer John Smith published *Fruits and Farinacea the Proper Food of Man* (1853), subtitled "Being an attempt to prove, from history, anatomy, physiology, and chemistry, that the original, natural, and best diet of man is derived from the vegetable kingdom." Straying from biblical injunction to scientific theory, Smith advised self-control, re-education, and gradual dietary adaptation along with a guarantee that fruits, vegetables, and grains sustain human nutritional needs. His work, still read in the twenty-first century, erred in the dismissal of legumes as minimally valuable to health.

Nutritional Debate

Gradually, Asian concepts of what is allowable on the menu earned favor with other reformers, notably, the Salvation Army and temperance workers. When the first vegetarian restaurant opened in Leipzig, Germany, in 1875, followed by others in Liverpool, London, Manchester, and Portsmouth, England, and in Sydney, Australia, passersby thought the menu eccentric. Those uninitiated into meatless cookery often ordered a meal out of curiosity and found choices lower in price than standard commercial fare. Because menus favored Indian curries or Mediterranean vegetable ragouts, customers ate with a spirit of adventure. However, carnivorous home cooks considered vegetarians and teetotalers nuisances because their feeding demanded a separate menu and imaginative restructuring of traditional entrées.

Another food writer and instructor, Jules Arthur Harder, head chef at San Francisco's Palace Hotel, acquired experience during his tenures at Saratoga's

Grand Union Hotel and New York City's Union Club and during a decade at Delmonico's steak house in Manhattan. He initiated a huge undertaking, which he called *The Physiology of Taste: Harder's Book of Practical American Cookery* (1885). His proposed six-volume compendium launched an exhaustive study of herbs and vegetables based on culinary science. In his catalog of 300 fruits, herbs, and vegetables, he explained when and how to buy fresh produce and how to prepare it. He compiled a large collection of recipes for boiled, braised, fried, parboiled, puréed, and stuffed lettuce and cited opinions on the best way to dress lettuce salad. Because his pompous, judgmental air made few converts, the first volume ended the project.

Extremes of Opinion

One alarmist, San Francisco journalist Daniel O'Connell, declared late-nineteenth-century abstemiousness foolish and shortsighted. In a diatribe, *The Inner Man: Good Things to Eat and Drink and Where to Get Them* (1891), he accused ascetic theologians of interfering with pleasures of the table by fettering individual freedom of choice. He attacked beliefs that followers of Asian religions maintain muscle and strength without eating meat. By his reasoning, no vegetarian nation had produced any lasting good in contrast to the achievements of Peter the Great, Dr. Samuel Johnson, Friedrich von Goethe, William Wordsworth, and other meat eaters. O'Connell warned youth that abandoning meat robbed them of strength. For anecdotal evidence, he pointed to the Harvard University rowing crew, who ate only vegetables while training for a race against meat eaters from Oxford University, and blamed the Americans' loss on specious dietary beliefs.

In 1897, the Theosophical Publishing Company in Wheaton, Illinois, issued Constance Wachtmeister and Kate Buffington Davis's *Practical Vegetarian Cookery*, one of the first U.S. vegetarian guidebooks. The text warned that disease in cattle revolted the home cook, who turned to vegetables in search of purer foodstuffs. Theosophists added that clean cooking and dining readied the astral body for the afterlife by liberating the spirit from earthly dross to rise to heaven. The authors also characterized salt and alcohol as poisons and valued steaming

over boiling for preserving nature's goodness. Divided into 37 subheadings, the compendium covered home cooking for family and invalids, whom it tempted with arrowroot, creamed gruel, and rice foam.

In Tennessee in 1904, Eugene Christian, author of *The Encyclopedia of Diet* (1916), and his wife, Mollie Griswold Christian, published *Uncooked Foods and How to Use Them: A Treatise on How to Get the Highest Form of Animal Energy from Food*. An unusual tack of these nature-food proponents was the claim that a return to a natural diet would end kitchen drudgery for American women, to whom they dedicated their work. They typified the home kitchen as a source of vassalage, where the house wife stood over a miniature furnace and inhaled the toxic smell of broiled and frying flesh. The melodramatic description of preparing lunch and dinner placed the woman of the house in charge of a blazing firebox topped by greasy cookware. The authors fantasized that the home cook, like a pirate, unfurled a dishrag over blood and bones.

A Californian, Edward Giles Fulton published a similar warning, *Vegetarian Cook Book: Substitutes for Flesh Foods* (1910), which advised meat-eaters that they were chewing themselves into an early grave. In place of flesh dishes, he proposed natural entrées rich in fruits, grains, nuts, and vegetables. To stave off cravings for meat, he compiled nut-based substitutes—ersatz chicken soup, meatless sausage and hamburger steak, mock whitefish, and vegetarian salmon fillets. Pantry provisions called for nut gravy, nut loaf, nuto cero, nuttolene, and protase, all patented meat substitutes common in markets of the era.

Twentieth-Century Innovations

In the early 1950s, a Japanese couple, Aveline and Michio Kushi, popularized macrobiotics, a health regimen that forbids dairy products, meat, and processed foods. They based the nutritional system on a theory of the Greek physician Hippocrates, who coined the term *macrobiotics* to mean quality health and longevity. The couple asserted that a meat-heavy diet disturbed international harmony and undermined global peace by supporting aggressive behaviors. Aveline Kushi first studied a controlled environment in the writings of philosopher Georges Ohsawa, founder of the macrobiotic movement. Until her

death in 2001, she educated individuals and families on the place of diet in nurturing stamina and wellness. As a source of organic and natural foods, she founded the Kushi Institute, a world center for macrobiotic education. Her proponents foster the One Peaceful World Society, an international network and support system for people seeking to cook and eat macrobiotic foods and to cure ailments with alternative medicine.

From her home in Boston and Erewhon, Kushi's shop in Brookline, and a sister school in Amsterdam, Holland, Aveline Kushi counseled clients and trained hundreds of cooking teachers and natural foods chefs. Aided by macrobiotic counselor Wendy Esko, Kushi also published *Introducing Macrobiotic Cooking* (1988), *Quick and Natural Macrobiotic Cooking* (1989), and *Aveline Kushi's Complete Guide to Macrobiotic Cooking* (1989). Her texts explained the how and why of vegetarianism, such as control of fats, and emphasized whole grains and green leafy vegetables. Kushi spotlighted miso soup, an enzyme-rich soybean soup that promotes digestion, and aduki beans for cleansing the system. The Smithsonian Institute accepted her collected works for display at the National Museum of American History.

In 1991, South African journalist Margaret Visser summarized the effort of cooking vegetarian style in *The Rituals of Dinner: The Origins, Evolution, Eccentricities, and Meaning of Table Manners*. While establishing what does and does not constitute a meal, she ruled out tea and biscuits and questioned the service of cold plates. In her opinion, history has conditioned people to expect a meal to include hot foods, especially roasted meats. From the cook's point of view, according to Visser, vegetarian entrées cost less, require less toil and cleanup than meat, and encourage sharing of portions. She concluded that, for those unfamiliar with vegetarian cuisine, meatless cooking requires more imagination and effort to convince diners that they receive a full and satisfying meal.

Avoiding Meat

British families began deserting the traditional beef roast in 1986, when bovine spongiform encephalopathy, or mad cow disease, first began and spread to 14

European nations. The rise of hoof-and-mouth and mad cow disease in Europe late in 2000 and into 2001 turned some cautious diners from red meat to fish, ostrich and kangaroo flesh, and vegetarianism. Italy experienced a 40 percent decline in beef consumption; in Germany, the percentage fell nearer to 80 percent. A poll of English eating habits in April 2001 turned up a sudden switch by 1.5 million carnivores to a nonmeat diet. While Continental restaurateurs assured patrons that their kitchens served only safe Argentine beef, diners began lining up for a table at Margutta Vegetariano restaurant in Rome and other vegetarian establishments throughout the continent. Cautious families bought vegetarian cookbooks and sought the advice of the Vegetarian Society on how to alter diet and cookery to satisfy those more accustomed to hamburgers and standing rib roast than hummus and moussaka.

On May 1, 2001, Hindu attorney Harish Bharti and others in Lynnwood and Seattle, Washington, filed a class-action suit in the state as well as in California and British Columbia against the McDonald's fast-food chain. They and Jewish, Muslim, and Sikh groups charged false advertisement that violated the sacred norms. After 1990, when the company announced a switch from frying french fries in beef fat to all-vegetable oil, religious ascetics patronized the restaurants to eat what they thought were fries untainted by animal fats. When editors of *India West* newspaper revealed McDonald's duplicity in April 2001, Hindus raged at false advertisement. In India, protesters smashed McDonald's restaurant windows; Hindu politicians demanded that the government oust the chain. Company official Walt Riker denied the charge of fraud and declared that french fries sold in India and Fiji were all vegetable. He added that the company never misrepresented itself as a vegetarian restaurant. The company requited the claims in 2005 with checks ranging from \$50,000 to \$1.4 million.

In February 2011, in an article for the *Journal of Agricultural and Food Chemistry*, biochemist Duo Li of Zhejiang University publicized the results of a three-decade study of veganism and vegetarianism. Research credited a meatless diet with building the immune system, avoiding diabetes, and controlling blood pressure, body weight, and cholesterol. New data also indicated that vegetarians increased the risk of heart disease, macular degeneration, and senile dementia. The lack of omega-3 fatty acids and vitamin B12 elevated chances of atherosclerosis and blood clots. Vegetarians advocated an increase of nuts to

supply omega-3 and of eggs, milk, yogurt, and yeast extract spreads such as Vegemite or Marmite to supply vitamin B12. The report ignited a twenty-first-century round of arguments as old as Hippocrates.

See also: Daubenton, Louis Jean-Marie; McDonald's; Polo, Marco; Pulses; Raw Cuisine; Theophrastus; Tofu.

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[Verrazzano, Giovanni da \(1485-1528\)](#)

The Italian explorer of the Atlantic Coast from Newfoundland to Florida and the Antilles, Giovanni da Verrazzano (or Verrazano) produced the first report on American Indian lifestyle and diet since the logbooks of Christopher Columbus.

Born at Val di Greve, south of Florence, Verrazzano chose to sail as a freebooter for France to the eastern Mediterranean and west to Newfoundland, a North American landmass familiar to fishermen and whalers. To pit the French against the competition of Spain and Portugal for new lands, in 1522, he convinced Francis I that exploration to the west might open French markets in Asia. Aboard *La Dauphine* (the Princess) at Dieppe, he and a crew of 50 set off for Cathay (China) in April 1523 in a four-caravel convoy. Eluding a blockade manned by the Portuguese and Spanish, he sailed from Madeira on January 17,

1524. His provisions included enough food for an eight-month voyage. After seven tough weeks of navigation through storms, on March 1, Verrazzano arrived ashore at a country he called Francesca and anchored south of the Cape Fear delta off North Carolina. By April 17, he had maneuvered upcoast, where native craft plied the shore. Historians surmise that his expeditions' contact with a virgin soil population decimated aborigines by spreading European pathogens.

In his letters to Francis I, Verrazzano admired the beauty of the land and its fertility. During a three-day visit to the Pamlico Sound beginning July 8, 1524, he reported on a 25-man foray to shore for fresh water at Hatteras, North Carolina. Farther north, near Chesapeake Bay, the woodlands produced cherry and plum trees as well as fruits new to the explorer. In houses built of woven mats covering bent saplings, some 30 residents composed a single family. In the style of hunter-gatherers, they lived on abundant beans and on birds, deer, and fish that they shot with arrows or snared with nets. Verrazzano determined that the Wampanoag survived long and well because of their lifestyle. Their congeniality enabled them to taste shipboard cooking of meats, but they set a limit on fraternization between the crew and native women. Verrazzano compared the wild grapes that grew upward into the trees with the wine stock of Lombardy. He named the region Bacchus Island and, despite the Indians' ignorance of fermentation, predicted that the nomadic Wampanoag could cultivate European grapes, grain, and olives.

The convoy departed on May 6, hugging the coast of Sandy Hook, New Jersey, and Cape Cod and Nantucket, Massachusetts. An encounter with the Munsee of New York bay ended in an unforeseen retreat from gale winds. At Refugio (Narragansett Bay, Rhode Island), Verrazzano rested for 15 days and enjoyed another exchange of foods with aborigines. He judged Narragansett corn the continent's best, which natives honored with ritual harvest observances. At Casco Bay, he encountered the Abenaki of Maine, who survived on fish and game as well as an unidentified root. Judging by their draping of pelts for garments, Verrazzano deduced that the natives hunted bear, lynx, and wolf. Because of the foul manners of the Abenaki, the voyagers moved on toward the Canadian Maritimes and named the region Arcadia. In July 1524, they departed Cape Breton Island for Dieppe. Food historians credit Verrazzano with carrying corn to Italy, from where it spread to France and Hungary, competing with the

potato as inexpensive peasant fare.

After his voyage to Brazil and Newfoundland in 1526, Verrazzano sought the patronage of Philippe de Chabot, admiral of France. The navigator turned a profit from the import of brazilwood, a source of red dye. In 1527, the cartographer Vesconte de Maggiolo published a map of the journey.

In March 1528, aboard *La Flamenque*, Verrazzano left Dieppe a third time for India. After locating Florida and sailing south into the Caribbean Sea, at Guadeloupe, he encountered the Carib, cannibals who may have mistaken him for more of Columbus's crew, the perpetrators of massacres on Indians. The man-eaters dismembered and ate the captain and six men of his crew. His brother, cartographer Girolamo da Verrazzano, returned home to report the catastrophe and to bear maps, gold and silver, and spices to the royal court. In 1556, Italian geographer Giovanni Battista Ramusio issued Verrazzano's commentary in a collection of correspondence by voyagers.

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Vinegar

A bright, tart condiment, foodstuff, and pickling liquid made by the biotransformation of alcohol, vinegar, or acetic acid, figures in food writing over much of culinary history. Around 8500 B.C.E., grape juice fermented into wine during storage. After a short period, wine lost its sweetness and soured into vinegar. To halt the transformation, vintners added terebinth berries and resin to the batch. Egyptians stored vinegar in urns in 3000 B.C.E. and added the liquid to

embalming fluids to preserve human cadavers. According to a Chinese food classic, Shen Nong's *The Divine Farmer's Herb-Root Classic* (ca. 220 C.E.), vinegar originated in East Asia in 2800 B.C.E. for use in food and pharmaceuticals.

A food conservation method dating to Mesopotamia in 2400 B.C.E., pickling imported cucumbers in brine prevented spoilage by replacing natural liquids with preservatives. A vinegar solution excluded oxygen while producing an acid marinade that soured by lacto-fermentation. The natural process required a warm, dark storage area. In the Fertile Crescent, pickling with date palm fruit vinegar or acidic figs or grapes made available such seasonal vegetables as cucumbers and cauliflower for long sea voyages and lemons and peaches for nomadic journeys.

In place of expensive red wines, Greek commoners drank *fouska* (diluted vinegar). After 400 B.C.E., Hippocrates, the Greek physician, dosed patients with vinegar to cure coughs and heal wounds. In 79 C.E., Roman encyclopedist Pliny the Elder wrote of the cooling effects of vinegar on the skin and as a treatment for hiccups, nausea, and sneezing as well as dog and spider bites and leprosy. Galen and the Moorish doctors of North Africa diluted vinegar in water to ease consumptives.

Roman cooks soaked artichokes in cold vinegar and slowed the spoilage of sardines by marinating them in hot vinegar. Laborers in the fields and legionaries on the march refreshed themselves with *posca*, a drink of watered down vinegar valued as a defense against malaria. Punishment of unruly soldiers and jailed prisoners involved flogging, following by soothing the flesh with oil and preventing infection with vinegar.

African and Asian acetification of foods received little commentary in early culinary texts. By 221 B.C.E., commercial vinegar made from salted plums achieved popularity and contributed to the five tastes of classical Chinese cuisine. In the eighth century C.E., Japanese samurai drank vinegar to boost stamina and strength. The Japanese and Koreans joined the Chinese in making soured rice wine a standard recipe flavoring.

Technological Advances

In the Middle Ages, French vintners in Orléans solved the mystery of vinegar making by adding “mother,” or a bacteria-rich starter, to ventilated barrels of beer or wine. In the presence of oxygen, over a period of 90 days, fermentation took place at a steady temperature of 85 degrees Fahrenheit (29 degrees Celsius). Eleventh-century vinegar makers at the Benedictine monastery of Spilamberto, Italy, courted royal patrons by sending barrels of their product to kings.

In Modena and Reggio, Italy, after 1000 C.E., the Este wine makers created the first balsamic vinegar as an aromatic and healing liquid related to “balm,” a medical soother. After heating with hot bricks, vinegar fermented for five years in casks of ash, cherry, chestnut, mulberry, or oak. The wood imparted an outdoorsy flavor that paired well with salad greens. Barrels of Este vinegar gave false hope to victims of bubonic plague that the tart liquid could kill germs.

Throughout the Renaissance, the French prospered at commercializing vinegar, which they flavored with basil, cherries, clover, fennel, garlic, lemons, peppercorns, raspberries, rose petals, and tarragon. Specialty shops stocked 150 varieties, each for a unique purpose, including tenderizing vegetables. Minorcans blended pepper and vinegar to season pilau; Cubans and Filipinos creamed vinegar and spices into a paste to make pork adobo sauce. In England in 1673, a growing vinegar industry prompted Parliament to tax output.

Into the colonial period in North America, the Chippewa of the Great Lakes region soured maple syrup to add to maple sugar for sweet-and-sour meat glaze and to use as a condiment and preserver of cucumbers and flavoring for milkweed pods. The Menominee favored maple sap vinegar as a liquid basis for greens cooked in cornmeal and pork fat. The Algonquin of Quebec ground cardamine root into relish flavored with vinegar. The Eskimo fried greens and meat in vinegar as a hot salad.

Canadian and U.S. vintners earned three times the profit from vinegar that they received from cider. In fishing villages, cafés offered crab boil, a steaming of crabs over hot vinegar. House wives retained the flavor of flowers and fruit by pickling mangoes and peaches whole with cloves and preserving nasturtiums first in cold, then boiling vinegar. Similar efforts produced ginger beer, tenderized game, and kept berry and cucumber ketchup, chicken, chili sauce, nuts, oysters, and watermelon rind safe in stone jars.

Commercial Varieties

During the Industrial Revolution, food processors used fruit and vegetable waste or B-grade wine to make vinegar. They sieved the liquid through wood chips to add a woody flavor and aroma. Forcing oxygen into the mix, an innovation of Dutch scientist Herman Boerhaave, sped up the souring process. By skimming the acetobacters that floated on the liquid, processors could initiate subsequent batches, thus increasing their profits. Barbecuing used ample quantities of vinegar to tenderize tough cuts of beef, chicken, and pork. In slave quarters in the Western Hemisphere, Africans turned chitterlings and pig's feet into edible meat by stewing in hot pepper and vinegar.

The British navy preserved vegetables in vinegar to prevent scurvy. Fish and chips stalls, which date to Joseph Malin's London venue in the 1860s, served vinegar in squeeze packets for sprinkling with salt. In the United States, pioneers packed casks of pickled vegetables to vary their diet on the way west. A shortage of medicines during the Civil War turned physicians to old-time disinfection of wounds with vinegar. An understanding of bacterial action on wine occurred in 1864 with the studies of French researcher Louis Pasteur. Temperance workers applauded the diversity of vinegars, which supplanted alcoholic beverages in such seasonal recipes as cranberry sauce and fruit shrub.

Over time, vinegar makers fermented pungent batches from bamboo, beech sap, beets, cane, champagne, coconuts, dates, honey, kiwis, malt, melons, molasses, palm flowers, persimmons, raisins, and whey. Chinese and Japanese vinegar makers began with rice wine; Spaniards initiated vinegar batches with sherry; Greeks used *oxos* (sour wines). Europeans preferred grape vinegar; on the island of Quemoy, vinegar makers specialized in sorghum flavor. In Indonesia, vinegar makers chose pineapple; Filipino vintners used coconut wine to make a marinade for "cooking" fish into kinilaw, a finger food flavored with chili, ginger, and onions. Mesoamericans opted for prickly pear cactus vinegar, a central ingredient in salsa and flavoring for toasted pumpkin seeds. White grapes, the source of balsamic vinegar, produced the mellowest vintages; beer, cider, and wine yielded the strongest flavor. Rice wine lay somewhere in the middle of the rankings.

Today, vinegar is a key ingredient in processed chutney ketchup, mayonnaise,

mustard, salad dressing, and vinaigrette. In the American South, vinegar stabilizes the tang in canned pickles, cole slaw, collard greens, potato salad, and vinegar pie. British and North American chip makers use chives and vinegar to add savor to deep-fried potato slices. The tart flavor also enhances the blander flavors of Irish lamb, Japanese sushi rice, and Russian beet salad.

See also: Cider; Condiments; Pickling; Wine.

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[Virginia Company of Plymouth](#)

A joint stock venture chartered by James I of England in April 1606, the Virginia Company of Plymouth (also the Plymouth Company or Virginia Bay Company) anticipated the settlement of the Atlantic Coast from Maine to the Potomac River.

Investors made vague plans for the enrichment of England by mapping a water route to Asian spice markets. On May 31, 1607, stockholders, backed by entrepreneur Ferdinando Gorges, equipped the *Gift of God* and a supply ship and dispatched 125 volunteers to found Popham Colony on the Kennebec River delta at present-day Phippsburg, Maine. Along the way, they discovered the teeming waters of Newfoundland's Grand Banks and filled their boats with cod. After landing safely on August 13, they awaited the arrival of a sister ship, the *Mary and John*, which beached on August 16.

The company built Fort Saint George, dug a moat, diverted a stream into an

artificial lake, and completed a compound of 12 cabins, a chapel, and storehouse. President George Popham, the customs agent at Bridgewater, Somerset, assured the king of ample cinnamon, mace, and nutmeg, trade goods that the colonists intended to exploit along with abundant furs, alum deposits, nuts, cedar, and oak. Settlers made wine from wild grapes and began gathering the roots of the vining smilax, also called greenbrier. The English had first received the flavorful root from Mexico in 1536 to compound into sarsaparilla, a pleasing drink and a tonic or tea to treat eczema, impotence, psoriasis, rheumatism, and syphilis. Because the colonists arrived too late to harvest a crop, more than half sailed back to England on December 1, 1607, aboard the *Mary and John*.

The Virginia Company of Plymouth succeeded but not at trade. From local lumber, colonists built North America's first seagoing ship, the 30-ton (27-metric-ton) pinnace *Virginia*. Popham's successor, Admiral Raleigh Gilbert, failed to establish a commercial relationship with Skitwarroes, the local Abenaki chief. Because of hostile Abenaki and a disastrous fire the following spring, the colonists abandoned their settlement. Boarding the *Gift of God* and the *Virginia*, the remaining 45 adventurers returned home with their furs and dried sarsaparilla.

The collapse of the Popham experiment proved beneficial to the Pilgrims, who learned from the returning colonists how to prepare for difficult winters by setting up fishing stations to provide enough cod and shellfish to sustain a colony until spring. Amid squabbles and litigation, stockholders of the Virginia Company of Plymouth dissolved the venture in 1609. The failure of the intended cod and spice trade also caused the English to reassess their hopes of immediate wealth from New England.

See also: Dried Food; Shellfish.

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[Voegtlin, Walter L. \(1904-1975\)](#)

In 1975, Seattle gastroenterologist Walter Lyle Voegtlin proposed that people revert to the protein-heavy diet of Paleolithic humans, who lived from about 2,000,000 to 8,000 B.C.E. Voegtlin served in the Department of Physiology and Pharmacology at Northwestern University in Evanston, Illinois, and taught biophysics and physiology at the University of Washington. In addition to publishing articles on gall bladder complaints, in the late 1940s, he created a treatment for chronic alcoholism involving an aversion response to vomiting. From his observation at the Shadel Sanitarium in Seattle, Washington, of alimentary canal ailments—colitis, Crohn’s disease, indigestion, and irritable bowel syndrome—he deduced that humankind could improve digestion and lengthen life by adopting the Paleo diet, the ancestral food of carnivores.

Only months before his death at age 71, Voegtlin shared his theories of food and health in *The Stone Age Diet: Based on In-Depth Studies of Human Ecology and the Diet of Man* (1975), a work he paid to publish at Vantage Press. Along with meticulous comparisons of the human digestive tract to that of dogs and sheep, he detailed the effects of eating on human functions. In chapter one, he complained about the diet of “citified” humans: “Our foods are chemically preserved, sweetened, colored, and flavored; they are canned, dehydrated, frozen, pasteurized, Fletcherized, fortified, ground, juiced, instantized, Osterized, precooked, prepackaged, puréed, pickled, salted, strained, and swallowed whole.” In addition to battling low digestibility of food, he shocked readers by claiming the legitimacy of eugenics, the controlled breeding of superior examples of the human species and the extermination of the defective and weak.

Voegtlin made specific lists of beneficial foods. In place of beans, bread, dairy products, pasta, rice, and sugar, he promoted fish and grass-fed meats, grubs and

reptiles, nuts and berries, sprouts and roots, mushrooms, and fruits and vegetables. Among the foods from the Stone Age, he recognized the particular value of acorns and almonds, amaranth and sunflower seeds, pecans, pine nuts, and prickly pear fruit. He insisted that, by adopting the foodways of hunter-gatherers, his patients could rid themselves of the modern curses of alcoholism, allergy, autoimmune disease, cancer, depression, diabetes, heart disease, obesity, osteoporosis, sprue (celiac disease), and stroke.

Voegtlin equated postindustrial malaise with the products of wealth and ease—sedentary lifestyle, overeating, indulgence in alcohol and smoking, and reliance on salty and sweet processed snacks. He concluded that diseases of civilization flourish where the diet focuses on refined flour and sugar, corn and potatoes, cheese, and ice cream. In their place, he promoted meals of cress and other greens, eggs, fruit, game, herbs, mushrooms, nuts, seafood, spices, and vegetables, the foods available to hunter-gatherers.

Debate arose in the late 1980s among anthropologists and nutritionists who challenged Voegtlin's summation of the strengths of a high-fiber Stone Age diet. At issue was the omission of brown rice, peanuts, potatoes, skim milk, vegetable oils, and whole-grain bread and pasta. Less dogmatic dieticians declared that stringent exclusion of carbohydrates and milk, two core foods, startled the body and generated cravings.

Voegtlin's theory, which he based on the elements of evolution, rested on clinical evidence from research into anatomical changes over time. After the rise of agriculture in 8000 B.C.E. and the addition of cereals to cuisine, humans declined in body mass and well-being. Anthropologists have noted a decrease in human height and the size of the bite as well as a spurt in dental decay.

By studying pockets of Stone Age tribalism in the Alaskan Nunamiut, the Gwi of Botswana, and Austronesians of the Trobriand Islands, researchers refuted Voegtlin's diet and charged that the modern lifestyle defeats health by creating an imbalance between stored calories and burned energy. Additional questions from experts about overpopulation, socially disruptive farming, and restrictive diet implied that Voegtlin's proposed food intake oversimplified the root causes of modern ills.

Despite its rigid notions of edible food and the value of human life, the Paleo diet gained followers. Loren Cordain, a specialist in health and exercise at

Colorado State University, popularized Voegtlin's regimen in *The Paleo Diet: Lose Weight and Get Healthy by Eating the Food You Were Designed to Eat* (2002). After reading about the diet in 1990 and practicing its food constraints, Cordain reported improvements in acne, arthritis, and breathing problems and gains in muscle mass. In *Primal Body, Primal Mind* (2009), nutritionist Nora T. Gedgaudas related the caveman diet to hormonal balance and the slowing of cellular aging.

See also: Allergies, Food; Ice Cream; Paleolithic Diet.

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Water

Covering some 70.1 percent of the global surface, water sustains humankind and its food sources. From prehistory, people have sheltered near abundant fresh water—the Mesopotamians between the Tigris and Euphrates rivers, Chinese along the Yalu, and Amerindians on the Amazon and Mississippi. Irrigation ditches spread water from creeks and precipitation across fields, sometimes directing 90 percent of potable sources to sustain crops, orchards, and livestock. In addition to rehydrating the body with about 2.5 quarts (2.4 liters) per day, water supplies to kitchens serve as solvents for making beverages, soaking husks from and steaming grains, and stewing fruit, meat, and vegetables into palatable cooked dishes.

Water permeates scripture with alerts to impurity. In India, the Vedas, Sanskrit scriptures begun in 1500 B.C.E., instructed the devout to choose cooking and drinking water only from rainwater, springs, streams, and wells. The Sutras (800–350 B.C.E.) advised Hindus to filter drinking supplies. Jainism revered water as a symbol of life; priests advocated a stringent regimen of boiling and straining water every eight hours before using it for cooking or for relieving thirst during fasts. Buddhists consumed only rainwater and grew lotus in their cisterns so that the roots and leaves would purify and the flowers perfume the contents.

Armies depended on large quantities of water to replenish marching men and dray animals. In 342 B.C.E., Alexander the Great learned from Aristotle, his teacher, to keep the Macedonian military hydrated and healthy by purifying field water supplies. The heating, evaporating, and cooling regimen anticipated distillation, a scientific method of ridding water of pathogens that can cause cholera, cryptosporidiosis, *Escherichia coli* (*E. coli*), gastroenteritis, giardiasis, and typhoid fever. Around 370 C.E., Hypatia of Alexandria, a Greek mathematician and inventor, devised a distillery to ensure an uncontaminated supply of water.

After the fall of Rome in the sixth century C.E., hydrology declined from

municipal control to guesswork. Medieval cooks chose between boiled or well water and supplies from questionable sources, usually buckets of lake, moat, or pond water. Monastery recipes composed by apothecaries often specified fountain or spring water as a guarantee of potability.

Some believers connected water with holiness and salvation. Muslim pilgrim Ibn Battuta, author of the travel memoir *On Curiosities of Cities and Wonders of Travel* (1354), described the significance of water to his once-in-a-lifetime hajj (pilgrimage) to the Arabian holy site of Mecca. Among other hajjis entering the great city, he prayed at the curtains of the Kaaba, the holy of holies, and drank at the well of Zamzam. Sacred water, he declared, quenched thirst and cured illness. He concluded with high praise to Allah, who blessed those visiting his shrine with unlimited sips from a holy thirst quencher.

For 20 percent of the world's people in the twenty-first century, water engineering provides businesses and habitations with the piping, filtration and purification equipment, and storage tanks for convenience and sanitation. Developing nations rely on less sophisticated means of securing supplies from aquifers, lakes and canals, and aqueducts and reservoirs. The least convenient, village standpipes and wells, require hand-carrying of buckets and jerry cans.

The dispensing of water through kitchen spigots became safer and easier to control from the invention of the single-handle union tap, the design of plumbing fixture pioneer Alfred M. Moen of Seattle, Washington. After burning his hands in water from a two-handled faucet while studying mechanical engineering at the University of Washington, he decided to improve on standard plumbing fixtures. In the 1940s, he created the one-control mixer, an ingenious simplifier and reducer of kitchen clutter.

Out of range of kitchen taps, bottled water offers immediate access to supplies, whether in jugs in electric coolers or in glass or plastic bottles carried to campsites and on tour buses. One liability of faddish water bottles is packaging in polyethylene terephthalate, which litters parks and highways and clutters local recyclers and landfills. However, the distribution of packaged water at disaster sites—earthquakes, fires, floods, wars—inhibits unsanitary conditions from spreading contagion. According to industry estimates, the global consumption of bottled water more than doubled between the years 2000 (over 100 billion liters, or 26.4 billion gallons) and 2010 (over 200 billion liters, or 52.8 billion gallons).

Soda and sparkling water bottlers—Coca-Cola, PepsiCo, Perrier— also offer beverages fortified with caffeine, fruit flavors vitamins, and minerals.

As nations face issues of variability in water supplies, scientists predict that threats to urban hydration will precipitate sectional conflicts and wars. The countries most at risk dot the African continent—Kenya, Mozambique, Sudan, and Uganda. An alarming shift in control in Australia and New Zealand allowed the privatization of water. To restore supplies to the public trust, the United Nations General Assembly in July 2010 declared sanitation and water justice as human rights. Proposals for alleviating human suffering from catastrophes and droughts and resultant epidemics and famine include abandoning field agriculture in favor of hydroponics, building desalination plants, investing in solar disinfection of water supplies, and even transporting icebergs to arid locales.

See also: Agroecology; Aquaponics; Desalination; Irrigation; Nutrition; Rice; Sanitation.

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Whaling

Since 6000 B.C.E., whaling in all the world's oceans has accessed meat and oil from cetaceans, the earth's largest mammals. Whales and sea animals form the basis of foodways among the Aleut and Inuit of Alaska, the Pacific Northwest, and Greenland. From prehistory, natives subsisted on hunting coastal whales and harvesting meat from stranded belugas, narwhals, porpoises, and three-ton pilot

whales driven ashore by fishermen in small boats. Off Vancouver Island, the Kwakiutl pursued the 6-ton (5.4-metric-ton) orca. In contrast, in the Bering Sea, Eskimos tracked the 60-ton (54-metric-ton) bowhead in kayaks and umiaks made of walrus hide. The slayer of so vast a meat supply earned the prestige of a chief.

From the Middle Ages, whaling in the North Atlantic off the coasts of Denmark, the Hebrides, Iceland, Orkney, and the Shetlands has supplied communities with meat. Between Iceland and Scotland in 1000 B.C.E., Faeroe Islanders made dolphins, porpoises, and long-finned pilot whales a staple of their cuisine. Villagers carved carcasses on the beach and along fjords into blubber for boiling and steaks for salting, air-drying, and serving with dried fish.

By 800 C.E., the Japanese began regular whale hunts for meat, which they valued as a luxury food. Pacifist Buddhists advocated whale consumption over shrimp because one animal's death could feed many. Priests promoted the distribution of tougher cuts to the poor. In the 1570s, the Japanese organized in-shore hunts by raising watchtowers and dispatching harpooners and netters to slay the 35-ton (32-metric-ton) gray, 30-ton (27-metric-ton) humpback, 9-ton (8.2-metric-ton) minke, and 100-ton (90-metric-ton) right whale.

Cash Business

Flensers stripped flesh from bone, separated fat from meat, and transported perishables to meat-processing warehouses. Cookbooks listed 70 cuts for kitchen use. At the end of the nineteenth century, Juro Oka, the father of modern Japanese whaling, introduced Norwegian stalking methods and technology from Finnmark County to Nihon Enyo Giyogo, his Nagasaki whaling firm. The successful venture made Japan the only nation to hunt whales primarily for human consumption rather than for cosmetic oils and pet food.

Simultaneous with Asian whaling industrialization, eleventh-century Basque fishermen from Bayonne, France, established a whaling consortium off Red Bay, Labrador, and St. Anthony, Newfoundland. After killing a right whale, they hoisted cauldrons on board their ships to cook blubber down to oil, a forerunner of the cod liver oil business. In the Arctic Sea and along the New England shore, Dutch and Newfoundland hunters focused on the bowhead; Icelanders preferred

the larger right whale. In 1803, the capture of Boston armorer John Rodgers Jewitt by Nootka off Woody Point, British Columbia, introduced him to the diet of Northwest Indians. In addition to clams and herring, they ate gray whale blubber and oil, which they stirred into servings of wild strawberries.

The market for margarine and inexpensive canned meat and meat cakes in the 1880s increased the strain on the baleen whale population—bowhead, gray, and right whales—until cotton and vegetable oils replaced animal sources. Oslo processors led commercialization by advertising whale meat as tasty as beef at one-third the price. World War I reduced supplies of beef, mutton, and pork and caused U.S. government leaders to advocate replacing familiar protein sources with whale meat.

By 1917, San Francisco restaurants ordered canned whale meat in 100-pound (45-kilogram) boxes. In Victoria, British Columbia, clerks advertised “sea beef” for use in meat rolls, shepherd’s pie, steaks, and stew. New York restaurateurs proclaimed whale meat as the nouvelle cuisine favorite for hors d’oeuvres, *pot-au-feu* (stew), and plank steaks cooked on a hickory or oak plank. In 1918, department stores in Toronto and Winnipeg advertised canned whale meat as a Christmas specialty.

Marketing

To meet demand around Gibraltar, whalers opened a winter operation in 1921 on Iberia but failed to profit from canned or smoked whale meat, which they sold in the Congo. German whalers increased merchandising in the mid-1930s with the processing of blubber fiber, liver meal, and meat extract for kitchen use and other parts for feeding house hold pets and mink raised on ranches. In anticipation of another global conflict, both England and Germany processed whale blubber into margarine and stockpiled edible fats. To make meat more flavorful, processors soaked cubed blubber in soda ash solutions.



Japanese fishermen slaughter a Baird's beaked whale at one of the few ports at which whaling is allowed for "research" purposes. The Japanese have actively resisted an international moratorium on commercial whaling that went into effect in 1986. *(Koichi Kamoshida/Getty Images)*

Because whale meat tastes more like venison than fish, it pleased Asian diners but not many Americans or Canadians. After the devastation of World War II, the Japanese refused to kill dolphins but depended on whale meat for half of their protein and much of school lunch diets. On May 19, 1946, nine months after the country's surrender to the United States, one-quarter-million Japanese launched a Food May Day before the Imperial Palace. Because of food scarcity, they demanded that General Douglas MacArthur, head of Allied occupation forces, rescind antiwhaling restrictions. In August, he authorized a deep-sea whaling hunt to Antarctica. The relaxation of sea hunting laws, for the first time, made whale consumption a daily part of Japan's cuisine. The stalking of the 180-ton (165-metric ton) blue whale and other baleen whales along migration routes from the Antarctic increased kills to a height of 220,000 tons (200,000 metric tons) of marketable meat in 1962.

Monitoring Slaughter

At Bournemouth, England, in 1986, international restrictions on overhunting by the International Whaling Commission placed a moratorium on annual catches that exceeded the species' ability to reproduce. Laws destabilized the traditions of coastal peoples—Ainu, Aleut, Chukchi, Haida, Inuit, Klallam, Kwakiutl, Makah, Nootka—further suppressing their aboriginal rights to subsistence hunting. Protests emerged from Iceland, South Korea, and the Soviet Union.

In the 1990s, Norwegians in Reine contested U.S., British, and German controls on hunting minke whales, which flourished in larger numbers than the endangered blue whale. The Japanese fishing industry fought the ban by advertising the low-fat, high-omega-3 food value of minke meat as an ideal seafood for schoolchildren. Preservation of the practice of catch sharing bolstered a distribution system that had ensured community solidarity since feudal times.

Currently, meat markets in the Arctic, Iceland, Japan, and Norway stock whale meat. Unlike the meat cutters of the early 1800s, who divided the kill into 70 different cuts, today's preparers offer mainly belly and fluke cuts. Eskimos prefer fluke fat, a prime cut they award to the successful whaling captain. When offered in food stores, fluke meat costs three times the price of belly cuts. On a beach haul of a bowhead kill at Barrow or Kaktovik, Alaska, Eskimo families gather *muktuk* (skin) to heat on a pot for all viewers to taste, a communal ritual dating to prehistory.

Worldwide, menus featuring whale meat offer bacon and jerky, other cured or marinated meat, grilled blubber, *udemono* (boiled organs), and cartilage salad. The Japanese choose whale meat for New Year's feasts and for honoring ancestors at the Shinto home altar during the August All Souls' Festival. In Osaka, *nabe* (skin stew) is a specialty served with mizuna (peppergrass). Sashimi (sliced raw whale meat) refers to marbled dorsal fin, flipper, jaw, or red (muscle) meat.

In schools in Kyoto, Nara, Osaka, and Tokyo, beginning in 2006, lunch programs doubled the stocking of whale meat in school meat lockers. A countermove by environmentalists the following year declared sperm whale meat too polluted with dioxin and heavy metals for frequent consumption. Whaling in Iceland virtually collapsed. In 2008, Faeroe Islands medical authorities altered the

national diet by declaring the pilot whale too toxic from dichlorodiphenyltrichloroethane (DDT), mercury, and polychlorinated biphenyls (PCBs), which accumulate in whale blubber.

See also: Arctic Diet and Cuisine; Endangered Species; Japanese Diet and Cuisine; Trading Vessels.

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Wheat

Domesticated wheat, one of the eight founder crops of paleoagriculture, introduced a basis for world cuisine and a major source of vegetable protein from the Fertile Crescent to most points of the globe. The earliest wheat preparation occurred at a grinding stone at an archaeological dig in the Rift Valley of Israel around 17,000 B.C.E. During the Neolithic revolution around 12,000 B.C.E., acorn consumption declined. In its place, self-pollinating wheat proved easy to grow, gather, and store. In contrast to acorns, threshed grain provided digestible, easily chewed grains for roasting. Pouches of charred or roasted wheat bore a fragrant, savory, and stable travel food easily packed and consumable without further cooking.

After the settlement of Abu Hureyra in western Mesopotamia (Syria) around 11,050 B.C.E., a dry millennium forced inhabitants to cultivate grain fields and to

select natural free-threshing hybrids with the largest grains. As the population density increased from 1 to 15 persons per square mile (less than 1 to about 9 persons per square kilometer), protofarmers domesticated einkorn and emmer wheat along with barley, bitter vetch, chickpeas, flax, lentils, and peas. From the Karacadag Mountains south and east, Syrians made grain their primary foodstuff. Benefits of wheat growing included forage for domesticated herds and thatch for roofing shelters.

In Mycenae, Sumer, and Troy from about 10,500 B.C.E., wheat processing contributed to the replacement of flatbread in urban baking styles. Sumerians made the first sourdough to form light risen loaves. Cultivation in Jordan and Turkey spread across the Balkans to Serbia, the Danube River delta, the mouth of the Rhine; as far west as northern Italy and Valencia, Spain; and north to Denmark and Britain. From the Mediterranean shores to the northern coniferous forests, single-grain einkorn wheat (*Triticum monococcum*) flourished as one of the first domesticated crops cultivated in the Neolithic period. Dating to 9800 B.C.E., emmer (*Triticum dicoccum*), which grew wild in Israel and on the West Bank of the Jordan River valley, provided the most nutritious and palatable grain and the easiest to harvest in prehistory.

According to ethnobotanical studies, at 80 percent of excavated sites, wheat fed the Assyrians, Babylonians, and Egyptians. Professional bakers in the Nile River delta developed wheat loaves into the first commercial food enterprise. Spreading to Cyprus, Germany, Iberia, India, and Scandinavia, wheat served brewers as a basis for beer and cooks as a source of high-fiber bread and a thickener for soup. Its chewy texture and nutty flavor satisfied hunger and introduced dietary fiber while supplying calcium, iron, magnesium, protein, and vitamins A and C. Because of its improvement to the human diet, grain cultivation on settled farmland rapidly replaced rigorous and risky hunter-and-gatherer nomadism.

Developments in Consumption

By 7000 B.C.E., natural selection in central Europe resulted in durum wheat (*Triticum durum*), a free-threshing grain that yielded 15 percent protein, as contrasted with soft wheat, which contained 10 percent protein. Durum, the

second-most-common commercial wheat, became the source of Iberian noodles, Italian macaroni and pizza, North African couscous, Syrian pilaf, and Turkish bulgur, a high-fiber, low-glycemic (sugar-producing) grain. Cooks in Armenia, Bulgaria, Greece, and Iran also favored durum flour for stuffings and tabbouleh.

The invention of the horse collar in 3000 B.C.E. simplified the job of plowing by not pressing on the draft animal's throat. The gentler harness increased the acreage that one wheat farmer could cover. By 2000 B.C.E., wheat production advanced beyond the Caspian Sea as the Chinese adapted traditional cuisine to include wheat. Chinese, Japanese, and Vietnamese Buddhists welcomed steamed wheat gluten as a staple of vegetarian dishes.

A standard rural meal among pastoral Europe ans involved the boiling of flour at the hearth with salt or *siraion* (wine must) and either milk or water to produce sweetened porridge. According to Hippocrates's *Regimen II* (ca. 400 B.C.E.), Greek cooks traditionally baked wheat into unleavened cakes. More elaborate recipes for *diepnon* (the main or evening meal) called for frying wheat batter into drop biscuits or pancakes, baking in crockery or under layers of ash, or stirring in an urn into sweetened *maza* (porridge), the main Greek dish. More sophisticated cuisine replaced traditional cookery after 300 B.C.E., when Greek kitchen styles influenced Roman cooks.

Because Rome grew into an urban metropolis, citizens formed 75 percent of the daily diet around wheat gruel. The devout revered wheat for funeral meals and grave gifts. Consumers, who grew no crops, depended on Egypt, the ancient world's major grain seller, to stave off food shortages. In 230 B.C.E., because of the burgeoning population of the Roman Republic and its reliance on wheat imports, Consul Gnaeus Fulvius suppressed Illyrian pirates, who had been commandeering grain convoys from Egypt, North Africa, and Sicily. Within two years, Fulvius ensured wheat imports by quelling piracy around the Black Sea and along the Red Sea. Unhampered imports restored wheat to Roman military provisions and rid the citizenry of cyclical grain shortages.

To feed the plebeian class, Augustus, Rome's first emperor, instituted the *annona* (poverty relief), for which he annually imported 14 million bushels of wheat. More than four centuries later, the Gothic siege of Rome in September 408 C.E.C.E. drove the city into a food panic. The reduction of the daily wheat ration from one-half to one-third wrecked the Roman Empire. For the next four

centuries, Rome's population shrank by 90 percent from hunger and disease.

Previous military occupation introduced parched wheat into the diet of Celtic Britain. In the 700s C.E., einkorn *hwaete* (wheat) became the main Anglo-Saxon cereal crop as well as a form of currency for requiting monetary court judgments. Unlike Arab and Indian reception of grains, Britain's agrarian traditions shifted slowly toward bread wheat, in part because of culinary habit and resistance to agrarian and nutritional imports from Asia.

After the Spanish colonization of Peru in the sixteenth century, Spanish settler María de Escobar, a benefactor of the Inca, introduced grain cultivation in the Andes Mountains. On the South American frontier at Cuzco in 1535, she sowed a half sack of grain she imported from Spain. In Cañete Valley southeast of Lima and south of Machu Picchu, she taught the Inca the value of barley and wheat. For three years, she distributed 20–30 seeds each to other colonists for introducing in Peru and Chile. At the Dominican church, established after Pizarro arrived in 1534, some wheat growers used the harvest as an altar offering, a parallel to the reverence of wheat in Egypt and Rome.

Agrarian Revolution

As new varieties of wheat evolved, farmers adopted easily milled hull-less grain and practiced crop rotation and fertilization, both boons to yield. In 1713, British agronomist Jethro Tull's invention of the seed drill and four-coultured disk plow augmented wheat growing at the harvest rate of eight times the number of sowed grains. The colonial age added new wheat farms in Argentina, Australia, and North America. The application of guano to fertilization in 1830 boosted nitrogen in depleted Euro pean soil.

During the Industrial Revolution, cooks popularized soft wheat, which gave bread and pastries more elasticity and a springier texture. The formulation of fertilizer in 1909 by Carl Bosch and Fritz Haber of BASF, a German chemical firm, replaced dwindling sources of imported guano for field revitalization. In the Great Plains of North America from 1901 to 1918, Mark Alfred Carleton, a botanist at Kansas State University and the U.S. Department of Agriculture, rejuvenated dryland agriculture by introducing American farmers to durum

wheat, which eventually flourished in half of Kansas's wheat fields and in Montana and North Dakota. The collapse of Russian wheat farming at the end of World War I produced a doubling of wheat farming in Kansas to meet global demand. The invention of the tractor reduced acreage needed for draft animals, thus freeing 25 percent more land for wheat growing.

The International Maize and Wheat Improvement Center (CIMMYT), formed in Spain in 1943, developed more resilient strains of wheat for nourishment and commerce. While assisting Japan in rebuilding its economy in 1945, U.S. General Douglas MacArthur appointed wheat specialist Samuel Cecil Salmon to collect indigenous grains, including Norin 10, a large-eared, semidwarf wheat raised in Iwate, in northeastern Honshu. Orville A. Vogel, a wheat breeder in Washington State in 1949, crossed short-strawed grains that yielded 25 percent more output than conventional varieties. Because the 2-foot (60-centimeter) stalks survived high winds, the cultivar assisted global developers of sustainable farming. Ample wheat harvests engendered a protein-rich diet for the Green Revolution in Afghanistan, Bangladesh, China, Colombia, Ethiopia, Georgia, India, Iran, Kazakhstan, Kenya, Nepal, Turkey, and Zimbabwe.

Into the late 1970s, agronomist Norman Borlaug's dissemination of higher-yielding short-strawed wheat crops advanced nutrition worldwide. He began with Mexico in the 1940s, boosting its wheat harvests six times its former yield. In March 1963, he spread hybrid seed to the Punjab, followed by the Philippines and Africa. On the basis of wheat production, India became self-sufficient in 1974, disproving dire predictions of mass starvation. The application of DNA suppression by ethyl methane sulphonate (a mutagen) and by thermal neutrons and X-ray in 1983 enabled botanists to genetically modify wheat seed predictably and enhance grain diversity. By 1984, world grain yields had increased by more than 250 percent, raising food security in India and Pakistan by staving off a likely famine and malnutrition. Responding to conservationists who complained about increased use of pesticides, Borlaug declared them elitists who had no experience with world hunger. He projected that food security from high-yield wheat would boost the populations of Burkina Faso, Mali, Niger, Somalia, Uganda, and Yemen, necessitating 35 percent more calories to feed the next generations.

Genetic modification of corn, rice, and soybeans began the eclipse of wheat as

a global crop in 1998, when the Atkins, Dukan, and South Beach diets vilified carbohydrates from bread. By 2007, wheat ranked third after corn and rice as the world's most cultivated grain. British scientists furthered interest in wheat modification in 2010 by decoding the grain genome. As corn and rice prices rose, according to the International Grains Council, a major glut on the wheat market in Australia, Canada, India, Kazakhstan, Russia, Ukraine, and the United States in 2011 eased shortages and reduced prices.

See also: Einkorn Wheat; Emmer Wheat; Fertile Crescent Diet and Food Trade; Pasta; Pastry.

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Whiskey

For more than a millennium, aged whiskey, a satisfying fermented intoxicant of barley, corn, rye, and wheat, has added sparkle to entertainment and friskiness to social interaction. Distilling in Gaelic and Highland monasteries began before 1000 C.E. with barley beer, a compromise in the British Isles, a region that could not sustain grape growing for wine. Physicians prescribed whiskey for sufferers of bowel complaint, infection, smallpox, surgical pain, and tremors. Farmers and herders flaunted whiskey as a source of cash and recycled grain mash for livestock feed and as a class symbol of defiance of intrusive English nobility.

Monks and pharmacists became the original potion distributors. Peace officers attempted to enforce spirit licensing after 1367, but the Irish scoffed at Edward III and the Statutes of Kilkenny. The lower class chose distilling as a source of income over lace and woolen manufacture. The insolent openly danced jigs and sipped whiskey smuggled by underground distributors and dealers. First referred to by the Latin *aqua vitae* (water of life), whiskey in the anonymous Irish *Annals of Clonmacnoise* (1408) reputedly killed a chief, Richard Magranell of Leitrim, who overindulged on Christmas 1405. The chronicler made a macabre jest of *aqua mortis* (water of death).

The Scots Exchequer Rolls of 1494 identifies Brother John Cor as a Benedictine maltmaster at Lindores Abbey near Fife, the legendary birthplace of Scotch whiskey. Under royal contract from James IV of Scotland, Cor distilled 1,500 bottles of malt whiskey on June 1, 1495. The king, an imbibor of Highland, Islay, and Lowland stock, drew on bottled beverages controlled by the Guild of Surgeon Barbers in Edinburgh, the sole licensee to make whiskey. His subjects continued to flout the guild monopoly and trade laws and imbibed bootleg whiskey, the country's most popular drink.

An illustrated distilling manual, *Liber de Arte Distillandi* (*Book on the Art of Distilling*, 1500) by Hieronymus Brunschwig, a military surgeon from Strasbourg, France, established the methods by which fermentation turns grain into alcohol, a valuable drug therapy. After Henry VIII seized monastic properties in 1536 and forced monks to take lay jobs, they set up distilleries as cottage industries that marketed smooth aged whiskey.

On March 8, 1608, James I of England charged Bishop Andrew Knox of Argyll and the Isles of Scotland with improving Irish behavior. Knox declared that the chiefs' barbarity and feuding was an outcome of their love of "aquavite." To curb spirited Gaels, Knox's Statutes of Iona banned the importation of spirits for peasants but issued monopolies allowing landowners and the rich to make and drink Irish whiskey. The first licensee, Charles Water house of Munster, received Ireland's first seven-year whiskey patent for operations in County Antrim in northern Ireland. Water house's sublicensee, Thomas Phillipps of Ulster, owner of Old Bushmills, distilled yeast-fermented oat mash into Irish *usquabach* (whiskey).

Following the Act of Union with England in 1707, Scotland set the example of

a whiskey culture that refused taming by British excisemen and antismuggling raids. A Hogmanay (New Year's Eve) bash involved service of St. Andrews cakes and Scotch whiskey. On Burns's Night each January 25 since 1801, Scots have celebrated the birthday of plowman-poet Robert Burns with clapsot (mashed potatoes and turnips), haggis (stuffed sheep stomach), and traditional whiskey. Peat-smoking of raw barley for 30 hours combined the dehydration of moist grain with the fumigation of insects and the extermination of microbes in pungent malt whiskeys, such as Douglas Laing from Glasgow, Longrow from Argyll, and Talisker from the Isle of Skye. In northern Scotland, highland dairiers made crowdie, an unaged cream cheese that Viking raiders had clotted from skim milk in the eighth century C.E. and sealed in black pepper and oatmeal. At wedding celebrations, soft crowdie coated the stomachs of whiskey drinkers to ward off nausea.

American Whiskey

In 1783, the *Parliamentary Register of Ireland* denounced pubs as a nuisance and blamed cheap drink with the ruination of the Irish. Meanwhile, immigrants were transporting usquabach, the key ingredient in Irish coffee, to North America. In a lush agricultural setting, newcomers produced a distinctive male tipping culture based on an Old World ethic.

Both the Dutch and English colonials cleared land for barley fields and sold their surplus to Irish distilleries, which turned field corn into grain alcohol and bourbon whiskey, a corn-based enterprise allegedly invented in 1783 by T.W. Samuels at Samuels Depot, Kentucky, the home of Maker's Mark. The establishment of Hudson's Bay Company trading posts among the Great Lakes tribes and the Inuit expanded the natives' addiction to European brandy and whiskey. Traveler François de la Rochefoucauld predicted in *Travels Through the United States of North America* (1800) that intoxication would thin out indigenous peoples until none survived.

Upon retirement from the military to Mount Vernon in 1785, George Washington operated five copper stills to distill 11,000 gallons (41,600 liters) of barley, corn, and rye whiskey per year, a kitchen business that provided most of

his income. Bottled stock had numerous applications as curatives and flavorings. For curing meat, whether applied at low or high temperatures in the closed quarters of a metal chamber smoker or a walk-in smokehouse, whiskey-soaked hardwood chips imparted unique savors. Because Scots-Irish smallholders in western Pennsylvania rejected a federal excise tax levied in 1794, backwoods distillers raised a no-tax banner, the prelude to the Whiskey Rebellion on July 16. Three months later, President Washington suppressed the revolt by dispatching militia from Maryland, New Jersey, Pennsylvania, and Virginia.

In 1823, the first sour mash whiskey introduced controlled acidity during fermentation. Throughout the American Southwest, pioneers relied on whiskey to ease suffering from labor pains and wounds. Coexisting with Western medical practice, Chinese acupuncturists and herbalists treated the Asian population with opium in a whiskey solution to combat dysentery and influenza.

Spirits figured in a number of historic scenarios. When slave owners wanted to encourage harder work during planting and harvest, they doled out rum and whiskey from the big house to field hands. Sea-to-sea freighters to the California goldfields during the 1849 gold rush transported food staples, laudanum, and whiskey via steamer around Argentina, a treacherous dividing point between Atlantic and Pacific. Before breakfast and after dinner, ships' stewards on naval warships measured 4 ounces (118 milliliters) of grog or, during combat, of whiskey. On September 1, 1862, U.S. congressional action ended the sailor's grog ration.

The mid-1860s yielded acknowledgement of whiskey's significance to American society. Recipes for the absinthe cocktail, flaming Blue Blazer, Manhattan, Old Fashioned, Tom and Jerry, whiskey skin, whiskey punch, and whiskey sour appeared in the nation's first drink manual, Jeremiah P. "Jerry" Thomas's *The Bar-Tender's Guide* (1862). Mary Ann Bickerdyke, chief nurse and dietician under General Ulysses S. Grant, turned medicinal whiskey into a combat restorative. On April 7, 1862, she assuaged survivors of the Battle of Shiloh with dollops of whiskey in coffee or tea, a stimulant similar in purpose to wine distributions by nursing brotherhoods during the Crusades. In 1865, Congress repealed other temporary levies but retained the alcohol tax, which helped finance war debts.

On the frontier, whiskey came cheap at 12.5 cents a shot. Saloons became

popular places to drink, play cards, smoke, and order from menus that offered whiskey-soaked pot roast and steak. Jack Daniel's Tennessee Whiskey, a sour mash drink first marketed from Lynchburg, Tennessee, in 1866, rounded out the fellowship. Maryland barbecuers sauced slow-roasted pork with fruit chutney blended with bourbon whiskey and onions. New Orleans restaurants topped meat entrées with whiskey sauce. For Southern ambrosia, a Christmas specialty, cooks layered shredded coconut with orange slices, sprinkled on confectioner's sugar, and topped the mix with Southern Comfort, a sweet whiskey liqueur introduced in New Orleans in 1874.

In the 1880s, a plague of the American vine louse (*Phylloxera vastatrix*) that blighted British and French vineyards ruined the wine market, leaving the French to the mercy of dealers in *liqueur spiritueuse*. With fine brandies gone from competition, makers of blended and sour mash whiskeys commanded the market in the United States, while distillers of light, smooth rye whiskey in Canada seized a large share of international commerce. Contributing to British profits in Bristol and Liverpool, in 1880, Parliament repealed the tax on malt, sprouted barley, or other cereal grains that yielded enzymes to turn starch into sugar.

Prohibition and Beyond

On October 28, 1919, when the U.S. Congress passed the National Prohibition (or Volstead) Act, federal agents intervened in the manufacture, transport, and sale of any beverage containing more than 0.5 percent alcohol. Appalachian rebels fought regulation by moonshining, a covert distillation by night initiated in 1725 by Scots avoiding the English malt tax. Speakeasies survived on cases of Canadian and Mexican booze shipped on rumrunners, fast cutters that showed no running lights as they breached borders.

With shot glasses and cigarettes, women adopted coarse male exhibitionism at the bar as a declaration of gender independence. Country-western singer Tex Ritter popularized "Rye Whiskey," a 1933 plaint acknowledging the addictive power of alcohol. Although wine, brandy, and moonshine headed the list of private U.S. stock and home curatives, "dry" pressure groups such as the Woman's Christian Temperance Union (WCTU) cheered the defeat of "demon

rum” and attendant corruption from brothels and gambling.

When Prohibition failed in 1933, spirits returned to respectability for dining, entertainment, and sports events. Bars profited from drinks by the shot, a trend that burgeoned after World War II. Gay bars later helped boost the gay, lesbian, and transgender population to public attention and to break down prejudices against uncloseted homosexuals.

See also: Alcoholic Beverages; Curative Foods; Prohibition; Smoked Food; Temperance.

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Wild Food

Wild birds, fish, mammals, and plants provide a full range of edibles that grow at the whim of nature. Studies of the Paleolithic era as early as 98,000 B.C.E. authenticate the use of preagricultural foods for rural sustenance—bird eggs, bugleweed, fiddlehead ferns, grubs and earthworms, maple sap, minnows and river mussels, snails, snakes, sphagnum moss, and thistles.

In the Iron Age, Celtic hunter-gatherers from the British Isles to Eastern Europe depended year-round on seaweed and heather tea. They cooked currants into pudding and rowan berries into soup and baked medlars in season. For winter, they stored beechnuts and hazelnuts, flax, and dried bilberries, dewberries, and hawthorn and juniper fruits in sealed containers and preserved

taproots of horse radish, salsify, and wild carrots in peat and sand. Herbs suspended in warm, airy environments remained flavorful for adding to crab apple vinegar and sloe and wild plum wine.

North America

Nineteenth-century westering in North America offered European newcomers alternatives in bird and mammal entrées, especially wild turkeys and buffalo, and in bulbs, herbs, nuts, and wild fruits and vegetables, including blueberries, camassia tubers, cattails, elderflowers, muscadines, nettles, pecans, and prickly pear fruit. In pioneer days in Indiana, frontier families improvised new recipes and reformulated old ones by incorporating into their diet birch catkins, miner's lettuce, mustard greens, and wild persimmons, plums, and strawberries. Cooks ate watercress and violet salads and baked with amaranth and bullrush flour. In a pinch, they drank chicory when coffee ran out and added birch sap or meadowsweet buds to tea as a sugar substitute. Healers acquired respect for indigenous cures, such as cranberry juice to stem bladder infection, blackberries for kidney disease, mullein tea and sarsaparilla to relieve coughing, and wild blueberries for diarrhea, eye problems, poor circulation in the extremities, and chest pain.

In the twentieth century, food writers enlarged public awareness of the free harvest in the wild. In the 1960s and 1970s, outdoorsman Euell Gibbons's *Stalking the Wild Asparagus* (1962) and naturalist Richard Mabey's *Food for Free* (1972) encouraged gatherers to examine Stone Age and Amerindian diets for clues to wellness from wild edibles. In the United Kingdom, the availability of wild rose hips offered a free source of pulp rich in vitamin C. Northern Pacific cuisine featured in Margaret Craven's young-adult novel *I Heard the Owl Call My Name* (1967) introduced outsiders to *gluckaston*, a Kwakiutl seaweed stew cooked with corn.

Multiple-Source Diet

Worldwide, people strategize their livelihood from a combination of sources—

herding, raising crops, hunting bush-meat, and combing fields and shores for available produce. Gendered food chores often relegated fishing and hunting to adult males, while women and children gathered bird eggs, mollusks, seeds, and fruit. The sources met at the dinner table, where wild grapes and piñon nuts flavored venison or salmon and wild oats and yams thickened pones. In India, foraging sustained a starving populace during the food shortages of 1965 and 1987.

Throughout the famine of 1984 in Darfur, Sudan, an area suffering chronic ecological decline, the Sudanese depended on patches of wild food to flavor the small amount of millet and sorghum they could afford to buy at the market. Without the watermelon seeds and wild grasses and barley that made up 96 percent of their alternative diet, they risked starvation. Migration decreased chances of survival when refugees entered crowded camps among unfamiliar edible plants and sickened themselves on poisonous greens and berries. The most viable families relied on elders who had survived similar hunger crises in the 1940s.

Contemporary Foraging

Into current times, the persistence of wild plants during agroecological change returns degraded or war-torn areas to productivity. The canals of China that water overused rice fields sustain alga, locusts, fish, and frogs, all of which are edible. Eroded farmland in Kenya and Tanzania generates gullies in which wild legumes and gourd vines sprout. The clear-cutting of forests in Brazil and Zimbabwe increases opportunities for fungi and edible mosses to reproduce.

Parts of the world—central Australia, the Himalayas, Mesoamerica, Southeast Asia, and southern Africa and the Sahel—flourish with the flora and fauna that adapt to fallow swiddens and arid, jungly, and swampy settings. Botswana produces 100 animal species and 126 plants that nourish the Tswana, an agropastoral people. Between China and India, the Bhutanese supplement agrarian harvests with wild avocados, bamboo shoots, orchids, and taro; in northern Peru, the seminomadic Aguaruna subsist on wild birds, boar, monkeys, prawns, sago flour, and tender shoots. In Mali, the Gourma store millet to feed

them during the dry season; foraged greens rate a double value as vegetables and tonics. During periods of food insecurity in Turkana, a region overlapping Ethiopia and Kenya, the Ngiboceros increase their foraging from 25 percent to 42 percent. They refer to their gatherings as famine food.

Hobby Foraging

Today, Western survivalists and backpackers cultivate a knowledge of edible flora and fauna from the wild. They favor the plants that have nourished indigenous peoples from prehistory, such as the wild rice that centered the Ojibwa diet and the restorative wild grapes, mesquite and tepary beans, and Indian tea (*Ephedra fasciculata*) of the Pueblo. For the hiker, cacti, honeysuckle flowers, spruce gum, and spearmint, wintergreen, and clover or gorse tea with wild honey quench thirst when potable water is scarce. One ubiquitous example, wild spinach, tops the list of nutritious leafy plants for its fiber, potassium, and vitamins A and C. A versatile vegetable, it produces leaves for salads and sandwiches, steamed greens, and toppings for pizza and tacos.

Uninformed foraging carries dangers, particularly the appeal of poisonous mushrooms and nightshade berries and the collecting of hallucinogenic datura seeds and peyote buttons or picking blackberries or other fruits from polluted slopes. Young hikers, such as Boy and Girl Scouts learning orienteering, need guidance in selecting icicles and pond ice for potable water and in rinsing chickweed, clams, and daylily bulbs of grit.

In animals and plants, the stage of growth may determine safe consumption. Adult hares harbor parasites. Plants such as milkweed pods and pokeweed shoots are edible in early spring but not after they reach full size. Raw dandelion greens reach a bitter stage that can irritate the bladder and intestines. Only certain parts of some plants are safe to eat and those may require special preparation. Elderberry leaves and stems contain cyanide; rhubarb stems can be eaten but not the leaves. Calcium oxalate makes the jack-in-the-pulpit toxic, though the root is edible if properly dried or cooked.

See also: Blueberries; Buffalo; Bushmeat; Cacti; Fish and Fishing; Paleolithic Diet; Seaweed; Shellfish.

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Wine

A sine qua non of thirst quenching and social lubrication since the Neolithic era, wine has figured in farming, nutrition, healing, ritual, and commerce. Wine grapes (*Vitis vinifera sylvestris*) grew wild in the Caucasus Mountains near Shulaveri, Georgia, around 6000 B.C.E. Babylonians originated the fermentation of the juice of wild vine fruits through the action of natural yeast, which transformed sugar into alcohol. In the Zagros Mountains in 5400 B.C.E., Sumerian technologists at Godin Tepe and Hajji Firuz Tepe sank six large jars into mud brick floors. During the annual pressing and fermentation, workers added terebinth resins to grape juice as a preservative while the jars lay stoppered on their sides. By the 900s C.E., the wine of Shiraz, Persia, earned distinction as sherry, a prized wine of the Middle East.

In Armenia in 4100 B.C.E., vintners produced sacred red wine for rituals and for sale in Anatolia, Palestine, and Syria. Bottlers strained the latest vintage through metal sieves into goblets and passed them to wine tasters to sample. From this period of wine appreciation, Greeks allied bread and wine with heavenly blessings and spirituality. Athenians honored both foods through festivals, hymns, and sacred per for mances, the foundations of Western drama.

By 3000 B.C.E., China, Egypt, and Sumer operated profitable commercial plantations. Juice preservation involved methods of eliciting aroma, taste, and

viscosity by encouraging formation of tartaric acid, which prevented spoilage and enhanced transportability. Nomadic oenophiles valued fermented juice as a way to preserve fruit for famines and hard winters. Derived from Eastern grape preservation, the Mediterranean triad—grain, grapes, and olives—got its start with the fermentation of overripe grapes or raisins. To lengthen the shelf life of grape drinks, vintners introduced retsina, a resinated drink that Greek travelers introduced in the Crimea, Cyprus, Dalmatia, France, Italy, Lesbos, Rhodes, and Sicily.

Throughout the ancient world, vendors set up at city gates to sell surplus table grapes and skins of wine. Traders navigated the rivers to bear edibles to nearby commercial centers and followed Nile tributaries into central Africa to introduce their beverages in new territory. In the Nile River delta, amateur vintners learned to train vines on trellises and ferment grape juice. The Egyptians reserved their vintages for bureaucrats, priests, and royalty. Mourners supplied five ritual wines to the dead at mausoleums at Abydos and Saqqara, near Memphis. Vintners advanced industrial by-products by turning soured wine into vinegar, a pantry staple. Ceramic wine jars in the tomb of King Tutankhamen, sealed in 1323 B.C.E., attested to the boy king's preference for red wine.

To the northeast around 1200 B.C.E., because of rocky soil unsuited to growing grain, Phoenician (or Canaanite) farmers exploited commerce in fine olive oil and rich wines in exchange for wheat from Israel and Judah. The Phoenicians stored liquids in amphorae, two-handled jars crafted with a knob at the bottom for ease of pouring. They also imported barley, livestock, and wine from Egypt, Greece, Mesopotamia, Sardinia, Sicily, and the Atlantic coast of Iberia and revered wine as a suitable altar gift.

The adventurers and interharbor transporters of the ancient world, Phoenician shippers plied coastal waters and the Atlantic Ocean. In cedar plank ships, they disseminated wine from Aleppo, Beirut, Byblos, Sidon, and Tyre as far north as Cornwall, in southwestern England. The best, Bybline wine, earned a reputation in Greek poetry for bouquet and sparkle, perhaps evidence of muscat grape stock, a source of sweet dessert beverages.



At a winery in Italy's Tuscany region, renowned for its dry, red Chiantis, the vintner tastes a sample from an oak barrel during the fermentation stage. Viticulture emerged as a true agrarian science in the classical civilizations of the Mediterranean. (David Lees/Time Life Pictures/Getty Images)

The Etruscans, Greeks, Romans, and Phoenicians flourished at winemaking for medicinal use as well as dining. Around 850 B.C.E., Homer referred to fermentation methods, techniques that recurred in the poet Hesiod's *Works and Days* (700 B.C.E.) and viticulture expert Columella's 12-volume *De Re Rustica* (*On Agriculture*, ca. 50 C.E.). Workers stamped on raisin clusters and stored the *passum* (pulp) in clay amphorae sealed with gypsum. In the fifth century B.C.E., Enotria Tellus (land of wine), a vineyard network throughout Magna Graecia in Sicily and Italy from Calabria to Paestum, succeeded in marketing premium wines in Iberia, Italy, Provence, and Corsica.

Greek navigators peddled local wines through the Dodecanese to Pontus on the Black Sea and, after 500 B.C.E., from Massalia (Marseilles), the Greek colonial port on the French Riviera. While caravans delivered Mediterranean wines to China, the first water cargo carriers—round skin coracles—ferried casks of date palm wine along the Danube, Euphrates and Tigris, Nile, Rhone, and Yalu rivers. Within a millennium of honing transport methods and boosting sales, Athens led the Mediterranean in commercial wines, which vintners distributed in 3-foot-high (0.9-meter-high) terra-cotta jars, each holding 6.9 gallons (26 liters).

Everyday Consumption

From as early as 850 B.C.E. through the Talmudic period ending in 500 C.E., Hebrew imbibers celebrated Purim with honey and fruit turnovers eaten with wine. Jewish dealers in Gaza, Israel, and Jordan identified wine amphorae with clay inspection labels specifying date of filling and the vintner's identity. As dramatized in Homer's *Iliad* (eighth century B.C.E.), wearied Achaian soldiers during the Greek siege on Troy shared Pramnian wine in possets, a restorative blended with barley and honey and dressed with grated goat cheese. For Greek and Roman infantry and seagoers, supply trains ensured daily distribution of green olives, sourdough biscuits, beer, and *posca*, a drink of watered sour wine valued as a defense against malaria.

At home dinners, Greeks celebrated camaraderie with aperitifs. The loving cup, a two-handled sipping *krater* (bowl), bore hippocras, mead, or vermouth, an herbed wine. After meals, servers freshened cups with one-fourth to one-half water to pure wine to accompany fruit and nuts and small honey cakes.

During the same period, Chinese sage Confucius (551–479 B.C.E.) warned that drunkenness was socially inappropriate, an opinion unshared by the ordinary diner who relished vintages made with grapes from Dayuan in central Asia. By the second century B.C.E., dealers on the Asian frontier contemplated a beverage dealership with the west. In 138 B.C.E., ambassador Zhang Qian (Chang Ch'ien), an explorer and representative of the Emperor Wudi, extended vintage marketing from the Han dynasty to the Fertile Crescent and the seminomadic pastoralists of the Steppes. Chang recorded trade accounts for the imperial court on business with Afghanistan, India, Parthia, Turkestan, and Uzbekistan.

In imperial Rome, the wine industry upgraded technology with coopering, glass bottles from Syria, and screw presses. From the national food industry, Apicius, a first-century C.E. epicure, evolved recipes for beans served with celery, *caroenum* (wine concentrate), and fish pickle. His innovations included rue-flavored wine, a forerunner of Italian grappa, a distillate of pulp, seeds, skins, and stems. For common travel fare, he specified creamy hot mayonnaise and the preparation of *mulsum* (honeyed wine), a Roman favorite for stall-feeding swine.

Some of the encyclopedia articles of Pliny the Elder, Apicius's contemporary, elevated viticulture to an agrarian science and an element of medical treatment.

His 37-book *Historia naturae* (*Natural History*, ca. 77 B.C.) summarized the planting and pruning of prime grapes, the source of popular Opimian wine. He particularized the use of cedar, pine, and terebinth resins for stabilizing wine to prevent its souring into vinegar. Like Confucius, Pliny disdained overt drunkenness, especially where married women shared tables with men. He warned, "*In vino veritas*," indicating that truth emerges from a brain befuddled by strong drink.

The Roman Empire generated the first international cuisine by trading olives and wine from Italia for exotic imports. After 100 C.E., the Roman military consumed Gallic wines fermented in Bordeaux and tapped Silk Road commodities in Alexandria, Egypt. Buyers extolled Falernian and Opimian vintages, which Roman vineyards produced at the rate of 1,600 gallons per acre (2,450 liters per hectare). During economic depressions, Rome's senatorial class handed out grain, oil, pork, and wine among ghetto dwellers in the Suburra as a sop to political unrest. The empire's promotion of viticulture supported much of the food trade until the 600s. Ironically, while Muslims forced converts to abandon the fermentation and imbibing of spirits, the Christian Eucharist ensured perpetuation of Roman technology.

Late in the eleventh century, brandy and wine transportation demanded planning by provisioners of the Crusades. Because distillation concentrated flavors and removed fluids from brandy, it required smaller containers. In August 1096, the first Christian regiments marched from France, abandoning estate vineyards to monks in exchange for ongoing prayers for victory over the Saracens who overran Jerusalem. Some warriors left vineyards in their wills to prelates, who agreed to petition for salvation for the deceased in purgatory. Within three centuries, Benedictine and Cistercian brothers managed the largest grape-growing plantations in France and Germany.

During the First Crusade, combat interrupted supply trains from the West. In October 1097, according to William of Tyre, crusaders foraged around Antioch in northern Syria for more than seven months for pantry goods and Sidonian wine. Into 1098 along the Orontes River through Lebanon, Syria, and Turkey, the Calabrian Captain Bohemond, Robert of Flanders, and Tancred of Normandy led 20,000 men on grain and wine raids. In a winter of epidemic typhoid fever and near starvation, throughout the Holy Lands, nursing brothers treated sick

pilgrims and crusaders with cups of wine as restoratives and tonics. By the twelfth century, London merchants stocked Babylonian palm oil, pepper, spices, and Mediterranean wines, which returning soldiers popularized for their revitalizing effects.

Consumer statutes got their start in the Middle Ages with official strictures governing the quality and sanitation of foods and wine. Along the network of old Roman highways, food service at coach inns and pubs followed official dictates concerning fermented beverages. Rules covered sales in the eastern third of the Czech Republic, where hosts toasted guests with artisanal beers and wines. The wide selection influenced the foodways of Austria, eastern Bohemia, Silesia, and Western Slovakia.

Wine surveillance derived from multiple sources. Kosher house wives patronized a network of grocers and wineries that obeyed rabbinic edicts. In 1291, stringent French statutes forbade the concealment of original wine casks, the mixing of two wines, and the marketing of shipments by false name or vintage. During a peak in commerce in spirits in the late 1200s, ships arrived upriver to London carrying as many as 200 barrels of beer or wine each, a massive cargo for port authorities to inspect.

Travelogues and cookbooks treated oenology as serious science. Marco Polo's expedition to China, which ended in 1295, outlined the unique service of delicate Asian wines. Taillevent, the Norman-French master of late medieval gastronomy, proposed balancing cooking flavors by mingling vinegar with sweetened wine. The Renaissance set European event planners in search of aperitifs, brandies, cordials, and sparkling wines to accompany elegant menus. In 1501, Portuguese voyager Vasco da Gama identified India's coconut wine as a beneficial shipboard beverage.

In England, the Tudors revered hippocras, a wine cordial flavored with coriander and heated with a hot poker plunged into the serving carafe. For peace talks at the Field of the Cloth of Gold between Henry VIII of England and French King Francis I in June 1520, guests filled goblets at two red wine fountains. At Henry VIII's completion of Hampton Court in March 1532, a wine fountain spouted drink to refresh state guests. After 1573 at the court of Henry III of France, the royal *bottigliere* (cellar master) poured aperitifs onto ice and snow in each glass to make the forerunner of frozen daiquiris.

Global Exchange

The European discovery of Mesoamerica introduced aborigines to wine. On February 19, 1519, Hernán de Cortés set out for Yucatán with 600 soldiers and 20 horses and food and drink unfamiliar to indigenous peoples. Upon encountering the Maya, he welcomed them to food and wine. His arrival introduced Spanish grapes, the ancestral vines of the Central American wine industry. Latin American vineyards yielded an essential of evangelism at Franciscan and Jesuit missions along the Baja and California coast and into the Sierra Nevada lowlands.

Wine influenced the success of settlement to the northeast. To avoid scurvy, in 1620, Captain John Smith, Virginia's founder, listed as galley provisions lemon juice, marmalade, and wine, a source of ascorbic acid. At Patuxet, Massachusetts, in early October 1621, the sharing of food between Pilgrims and the Wampanoag set the model for Thanksgiving. To mediate a treaty with the Indians, Captain Miles Standish invited Massasoit, Samoset, and Squanto to a feast. To provision a three-day open house, Massasoit donated game and grape beverages.

Worldwide, wine commanded a place in daily cuisine. Chinese and Japanese vinegar makers cultured their stock from rice wine. Coastal chowder in Europe and North America lost some of its fishiness from the quality of wine thinning the broth. In the West Indies, papaya chutney dominated table relishes with the zest of lime juice and rice wine vinegar. The British sweetened apple wine by pressing the sugary juice of dessert fruit. In Germany, the making of *apfelwein* (apple wine) from Bramley and Granny Smith cultivars required the addition of astringent ser viceberries (*Sorbus domestica*) for flavoring. Sauces, rubs, pastes, and red wine marinades determined the flavor of Carolina and Texas barbecues.

Rules and Restrictions

Compelled by the religious fervor of the late 1800s, sobriety activists advocated replacing spirits with coffee. Local statutes typically left governance of wine consumption to community standards of celebration and ritual, such as a Jewish *bris*, Greek Orthodox confirmation, and Scandinavian wedding. Among North

American zealots, the demand for temperance aroused xenophobia against German, Italian, and Polish Catholic immigrants, for whom beer and wine defined festivals and fellowship among whole congregations. Prohibition gained momentum after the 1917 declaration of war against Germany. In England, the War Prohibition Act of November 1918 halted the production and sale of beer, liquor, and wine until demobilization as a redirection of labor and supplies from luxuries to necessities.

In the United States, vintners lost business from the passage of the National Prohibition (Volstead) Act on October 28, 1919, until its repeal on December 5, 1933. The absence of wine lists in restaurants ended table service of dinner beverages and champagne. More people fermented home brew and served wine from private cellars. The revival of aesthetic wine in the 1970s coincided with the purchase of investment labels. In public displays of refinement and expertise, gourmets frequented wine and cheese tastings offering niche labels and exotic flavor combinations, such as Stilton cheesecake iced with Madeira or port wine gelée. Worldwide, France, Italy, and Spain led the world in wine production, with France also number one in consumption.

In the late twentieth century, specialty menus paired dishes with distinctive vintages. Soul food turned blackberry cordial and muscadine wine into heirloom beverages served with apple dumplings and peach cobbler. In 1986, Slow Food advocates promoted unique dishes and wines from global markets. Chefs Mario Batali and Graham Kerr, *Saveur* magazine, and winemaker Robert Mondavi applauded the efforts of locavores to restore demand for drinks from regional vineyards, including the newcomers from Australia. In 2001, European members rallied against genetically modified (GM) grapes under placards demanding “No GM Wine,” an unstated support of heirloom vine varieties.

See also: Cussy, Louis, Marquis de; Fermented Foods; Greek Diet and Cuisine, Ancient; Mediterranean Diet and Cuisine; Plant Disease and Prevention; Pliny the Elder; Prohibition; Sicilian Diet and Cuisine; Silk Road; Temperance; Travel Food; Yeast.

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World Trade

Global commerce in food dominates world finance, creating the need for agricultural consensus, food security, international purity and quality distinctions, and the policing of airports and deep waters to prevent biopiracy and the smuggling of potentially harmful goods. Since the development of the Silk Road after 125 B.C.E., expansion of the Hanseatic League in the 1390s, and round-the-world voyages in the sixteenth century, food has traveled to far-flung markets, introducing outlanders to foreign cuisines and farmers to new money crops. Rapid transit of rations by air, land, and sea allows diners in remote locales to enjoy perishables, from lettuce and strawberries in Alaska and Iceland to bananas and Chinese shrimp in Antarctic commissaries and the International Space Station. The most active shippers rely on fruits, grain, meat, processed foods, seafood, and vegetables for up to 80 percent of their total exports.

From 1948 to 1994, the World Trade Organization (WTO), a specialized international agency of 153 members administered by the United Nations, set and supervised rules of market access. To prohibit cultural imperialism and new sources of global conflict, the WTO defined food categories and proposed duty concessions on a case-by-case basis. Members based their elimination of trade discrimination on the economic protectionism that impaired food distribution before World War II. Concerned experts worked toward an integrated system

free of cultural, political, and religious prejudice. A consensus regarding exploitation and oppression of labor turned international attention to issues of child labor and enslavement among migrant harvesters, notably grain reapers in Uzbekistan, grape and lettuce pickers in the American Southwest, and tea sorters in China.

Disputes arose thereafter as agrarian and fishing competition escalated. At issue lay the trade barriers in Japan, Mexico, and South Korea against the importation of apples from France and the United States, the world's leading exporters of fresh pome fruit. As opposed to nations marketing their fruit internally, the United States maintained that a broad range of global apple cultivars—Fuji, Granny Smith, Macintosh, Rome, Yellow Delicious—enhance biodiversity. Technology introduced pricklier topics for conciliation—chemical hazards, classification of additives and dyes as carcinogens, genetic modification, heirloom seeds, organic growing conditions, and packaging. A serious threat to small growers, proprietary hybridization funneled profits from single-use seeds distributed by Bayer, Calgene, Dow, DuPont, Monsanto, and Syngenta. Another troubling issue involved “like products,” a loose cataloging of processed foods derived from dairy, fish, meat, and vegetable products, such as cheese sticks, imitation crab meat, and unpasteurized fruit juice and yogurt drinks.

In a potentially explosive confrontation, the European Union (EU) controverted free trade in meat and dairy products in 1985 by prohibiting the use of growth hormones in cattle. Four years later, the EU banned Canadian and U.S. imports of beef treated with synthetic growth stimulants. A prolonged dispute arose in the WTO based on international accords on adulterated meat. To compensate for losses to the food trade, the United States imposed tariffs on meats imported from the EU. The levy inflicted hardship on European merchants, who imported more food than any other global area. Subsequent dispute resolution centered on the hidden agendas of agricultural interests to suppress free trade in such goods as bottled mineral water, honey, and infant food.

To reconcile issues that affected prosperity and precipitated hunger and malnutrition, in 1995, a multilateral trade consortium negotiated formation of the General Agreement on Tariffs and Trade (GATT). The smaller signatories—Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Congo, Costa Rica, Guatemala, Indonesia, Malaysia, New Zealand, Pakistan, Paraguay, Peru,

the Philippines, South Africa, Thailand, and Uruguay—protested onerous regulation of fresh produce and seafood, both high-income markets. Lesser competitors charged big nations with the distortion of commodity supplies and prices by the internal quotas and subsidies of industrialized countries, principally U.S. legislation protecting corn and cotton prices and subsidizing the soybean and sugar industries. To boost global welfare, diplomacy enabled members to lower trade barriers and countermand export restrictions—for example, rejection of eggs from Tanzania, blackberries and snow peas from Guatemala, and shrimp from Bangladesh based on microbial contamination and environmental pollutants.

Since November 2001, the Doha Development Round, launched at the GATT conference held in Qatar, has continued to address world marketing of coffee, grain, oil seeds, and tea as it applies to developing nations. In committee, Brazil, China, India, and South Africa represent preindustrial countries. Contention over agricultural imports of beef, chicken, and rice and serious concern for transnational food security and market access for farmers from the poorest nations involved mediators from China, India, and the United States into late 2008.

Subsequent negotiations indicate agreement that prosperous markets protect all growers and sellers. On June 4, 2011, Japan donated \$278,368 to the Standards and Trade Development Facility fund, which the World Bank created in September 2002. The purpose of grants and financial aid is to help have-not nations upgrade their border analysis of animal and plant health. With technologically advanced food labs, small countries identify and suppress substandard goods that contain pesticides and veterinary drugs or that spread foodborne *Campylobacter*, *Escherichia coli* (*E. coli*), listeriosis, bovine spongiform encephalopathy (mad cow disease), and salmonella.

See also: Abreu, António de, and Francisco Serrao; Biopiracy; British East India Company; Clipper Ships; Gama, Vasco da; Ice; Lapérouse, Jean François Galaup; London Virginia Company; Mail-Order Food; Maritime Trade Routes; New World Commodities; Roman Diet and Cuisine, Ancient; Vanilla.

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Y

Yeast

A fungus generating bubbles and froth in sugar, yeast raises bread and ferments beer, two cereal products that date to the beginnings of culinary history. Yeast takes two forms—ferment in such liquids as honey and molasses and leaven in solids, particularly grains and tubers. A mystery in the ancient world, the energetic organism grew naturally in sugary materials with a low pH (high acidity), including grape and peach skin and berries, and in fermented vegetables and starch

Beer, koumiss (fermented mare's milk), liquor, and wine acquire ethanol from the action of yeast on sugar, which feeds the fungal colony. The fermentation of coconut sap into toddy and of agave juices into *pulque* happens naturally from the action of airborne spores on saccharides (carbohydrates). The first sippers of such fermented drinks felt euphoria, and mystic interpretations of inebriation turned the beverages into holy gifts from the Greek deities Bacchus and Dionysus and the Aztec goddess Mayahuel.

The action of yeast on fruit processing occurred in the Caucasus in 8000 B.C.E. and subsequently in Armenia, Iran, and Macedonia. Greek cooks used yeasty grape must to make *oinoutta*, a moist anise-and cumin-flavored wine cake that Roman writer Cato the Elder exalted in *De Agri Cultura* (*On Farming*, ca. 160 B.C.E.). Egyptian, Phoenician, and Roman wineries turned processed grape juice into a profitable export, which they sealed into amphorae (two-handled pottery jars). The spread of Catholicism in the early second century C.E. encouraged wine making for use in the Eucharist.

The same gas-emitting action in bread and pastry intensified during rising and baking. In ancient times, wheat gluten offered a strong foundation for the growth of yeast colonies, which increased the versatility of high-protein dough for macaroni and noodles. The leavening produced air pockets in bread dough that lightened the crust and gave it a springy crumb and nutty flavor. Egyptian

experimenters became the first to cultivate yeast and dry it for storage.

In the 1300s, English bakers recycled ale barm as a leavening for bread and for an egg batter fried into “cryspeys,” a forerunner of the bagel, doughnut, fritter, and funnel cake. In Romania, Easter risen cakes celebrated Good Friday, an anticipation of the resurrection of Christ. The addition of the potato to European cuisine in the late 1400s offered a simple medium for growing yeast for home use.

For good reason, medieval brewers fermented more reliable ales by building their vats next to bakeries. By inoculating subsequent batches with yeasty mash from past successes, they cultured their ales with select strains of microorganisms. Experts developed a purification method of growing spores in boiled cane sugar. The method killed other ferments that yielded odd flavors in the finished wort. For its stability during travel, ale raised a devoted following among the New England Pilgrims, who imported ale casks to Plymouth, Massachusetts, in July 1620 as a daily beverage.

Viewed under a microscope for the first time in 1680 by Dutch scientist Anton van Leeuwenhoek, yeast came on the market in 1780, when the Dutch commercialized fermentation solutions for bakers. By 1825, the substance was available in cake form. Bakeries gained clientele for the light puffiness of their loaves; the Parker House Hotel in Boston earned a reputation for its delectable yeast roll.

The organic nature of the fungus remained a mystery until 1857, when French microbiologist Louis Pasteur identified the globules as living one-celled organisms. Specialists isolated yeasts by type. By eliminating wild yeasts and spoilage bacteria, food processors applied pure spores to particular needs, such as potato bread and pilsner beer, a pale lager.

To replace haphazard homemade starters, Czech immigrant brothers Charles Louis and Maximilian Fleischmann of Riverside, Ohio, unveiled an American yeast to consumers in 1876 at their Model Vienna Bakery, an exhibit at the Centennial Exposition, held in Philadelphia. The commercial brand produced a tender, aromatic crumb and consistent quality. The Fleischmann Yeast Company fostered a demand for granulated yeast and advanced to the world’s top yeast marketer.

Yeast has a history of fortifying the malnourished, beginning in the Middle Ages with the feeding of beer sediment to anemic infants. Public health nurses

distributed brewer's yeast in the American South in the early 1900s to combat pellagra, a deficiency of B vitamins. In 1902 in Australia, England, New Zealand, South Africa, and Sri Lanka, a British yeast extract called Marmite offered a savory, nutritious spread for bread.

During World War I, German peasants consumed yeast as a famine food for its protein and minerals. After World War II, refugees required a regimen of strength building, which included yeast. In 1943, English hematologist Lucy Wills, a pathologist for the Emergency Medical Service, found that commercially processed yeast bolstered the hemoglobin level in anemic pregnant women, improving their chances of producing healthy infants.

See also: Alcoholic Beverages; Beer; Bread; Seaman's Diet and Cuisine; Sourdough; Wine.

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Yogurt

A tangy semisolid dairy food, yogurt illustrates the height of bacterial fermentation of milk, a parallel to fermenting grape juice into wine. Originally a product of buffalo, camel, cow, ewe, goat, reindeer, or yak milk, yogurt first

coagulated naturally in 6000 B.C.E. from the enzyme chymosin, or rennin, accumulating in the pouches that Sumerian nomads made from sheep stomachs. The smooth texture of yogurt combined well with wild herbs for Balkan sour soups and in bulgur (cracked wheat) and millet balls, a combination favored by the Fulani of Nigeria. Russians sipped it like buttermilk.

Yogurt won devotees because of its benign flavor and a smooth texture. It answered the needs of infants and invalids, stimulated the immune system to fight infection, and dried well for travel food and winter storage. Mughal palace cooks turned yogurt into a binding agent for stew and a garnish for fruit and vegetable dishes. It also cooled the tongue after a bite of hot chilies. In Sumatra, enthusiasts cultured buffalo's milk into yogurt in bamboo tubes and served the velvety results over rice with chili sauce.

Cultured milk rapidly became a culinary staple for its versatility and long shelf life. Across the Caucasus, Balkans, and Indian subcontinent, the daily diet incorporated kefir, a yogurt drink valued for longevity and well-being. Persians paired honey with yogurt in 500 B.C.E. for a pleasing balance of flavors. In the southern Himalayas, yogurt provided cooks with a basis for desserts.

A versatile product, yogurt also served Greece and the eastern Mediterranean as a hair and body wash and as a treatment for enteritis. In the Balkans, Greece, and Turkey, recipes for salads, cold soups, and dips enhanced yogurt with cucumbers, dill, garlic, lime, mint, sea salt, and walnuts. In India, the addition of carrot, ginger, papaya, and pineapple produced a sweet blend. In 1215, Genghis Khan credited koumiss, yogurt made from mare's milk, with boosting the efficiency of his soldiers, who conquered Mongolia.

In a 1904 study of cultured milk, Bulgarian microbiologist Stamen Grigorov isolated *Lactobacillus bulgaricus*, the bacteria in lactic acid, and recommended the consumption of yogurt to suppress ulcers and tuberculosis. In 1919 at a shop in Barcelona, a Spanish physician, Isaac Carasso, commercialized pure cultured yogurt, the beginning of the Dannon brand. He popularized it as a preventative of dairy food intolerance and gastrointestinal distress, an antidote he developed from the research of Ukrainian microbiologist Ilya Ilyich Mechnikov, winner of the 1908 Nobel Prize in Physiology or Medicine. In 1933, the addition of fruit jam in Prague increased the selections of flavored yogurt in Czech grocery stores.

In the United States, yogurt became a model of the assimilation of ethnic food

into American cookery. During the Great Depression, Armenians Rose and Sarkis Colombosian in Andover, Massachusetts, began selling glass carafes of Colombo yogurt door-to-door to Greek, Lebanese, and Syrian immigrants. In the 1960s, health food gurus championed yogurt as a boost to the immune system and a source of calcium and milk protein for the lactose intolerant. Aficionados cultured their own batches at home with the aid of electric culturing machines.

[Recipe: Beef in Yogurt Gravy](#)

Flour 20 ounces of thin beef strips and pound them with a mallet. Panfry the strips in 1 cup of canola oil. Set the beef aside to drain. In enough pan drippings to cover the bottom of a skillet, deglaze with 1/2 cup of Burgundy wine at high heat. Sprinkle the deglazed drippings with granulated flour, sea salt, and a generous dusting of pepper. Continue cooking over high heat, stirring until the mixture browns. Whisk together 1 cup of plain yogurt and 1/2 cup of water. Add this to the pan, scraping the bottom to incorporate flavorful bits. Return the beef strips to the gravy and simmer until tender, about 20 minutes. Serve over salted egg noodles.

Throughout western Asia and the Balkans, children come of age on yogurt drinks flavored with chilies, mint, or salt. In Arab countries and India, strained yogurt reduces the proportion of whey to solids and yields a thick spread for pita and sandwich bread and as a cream base for meat and onion pies. In the twenty-first century, despite its higher price, natural Greek-style yogurt, which makers strained to remove some of the whey for a thicker product, gained popularity in the Americas and Australia as a staple in weight loss diets by replacing sour cream.

See also: Blenders and Food Processors; Fermented Foods; Guar; Tea; Travel Food; Vegetarianism.

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Chronology

B.C.E.

- 500,000–250,000** Control of fire increases the palatability of food and releases more nutrients into human metabolism from cooked meals.
- 200,000** The Paleolithic diet centers on wild food.
- 100,000** Neanderthal mourners supply meals for the dead as nourishment for a netherworld.
- 38,000** Spit roasting and pit cookery in North America increase flavor, texture, and aroma of meat haunches.
- 30,000** In Mesopotamia, flax serves human needs for dye and linseed oil.
- 25,000** Feral beasts adapt to human presence as a source of protection from wild predators.
- 18,000** Homo sapiens make the first use of grinding stones to separate husks from digestible tissues of nuts and grains.
- 17,000** In the Rift Valley of Israel, seeds of the self-sowing hulled emmer wheat satisfy hunger and introduce dietary fiber and high nutrition.
- 13,000** Cave paintings in Bitor, Spain, depict the collection of wild honey. Neolithic farmers hybridize fruit and grain, beginning with Chinese and Indian strains of rice.
- 12,000** Hunter-gatherers embrace farm life by planting einkorn wheat on the western end of the Fertile Crescent.
- 11,050** Drought forces early Palestinians to water sheep herds, irrigate home gardens, and cache grain in storage pits as famine food.
- 10,500** At Nevalı Cori, Turkey, the historic transition from hunting and gathering to domesticated einkorn wheat begins the shift in cookery from pit-roasted meats to bread, flour, noodles, and pasta.
- 10,000** The Nordic Sami follow reindeer herds, producers of milk and venison cooked over pit fires.
- Brazilians and eastern Peruvians elevate manioc to a trade commodity along

the Lower Amazon, Orinoco, and Guianas rivers.

9500 In southeastern Turkey, Syria, and Lebanon, lentils add a high-protein pod plant to the human diet.

9000 Neolithic cuisine in southeastern Turkey contributes cooked legumes to a meat diet and relies on herding and dairying as a reliable source of food.

8500 Syrians first cultivate barley as a cereal grain and source of bread and beer.

8000 Herders in India raise zebu for meat and evolve dairy foods from cows.

Egyptians begin baking flatbread.

7500 The chickpea adds protein to the diet in the Jordan Valley, Israel, and southeastern Turkey.

7000 Worldwide, farming and animal husbandry improve under formalized methods and strategies, including the cultivation of bitter vetch as a forage crop.

Babylonian farmers enhance revenues by making new beverages from dates and palm sap and by diverting malted grain to brewing 26 different beers. The Maya of the Yucatán Peninsula develop a corncentric diet.

6000 Yogurt coagulates naturally in the pouches that Sumerian nomads shape from sheep stomachs. Wine grapes originate in the Caucasus Mountains. Pea cultivation in the Middle East adds a nitrogen-fixer to garden plants.

5000 At Ur, Sumerians achieve state-run agriculture. The Mediterranean diet begins forming in the Middle East.

The potato enters cultivation in the Lake Titicaca area of Peru.

4500 Ukrainian herders gentle the horse, a major contribution to streamlining field labor.

4100 A cave winery in Areni, Armenia, produces sacred beverages reserved

for ritual.

4000 Drought forces farmers from the Sahel south to Mali, where they adapt to bushmeat and wild food.

From Texas to Manitoba and Saskatchewan, Amerindian stone mallets reduce buffalo muscle to meat flour for pemmican.

The first curry is derived from the mortars and pestles of the Mohenjo Daro, whose occupants add mustard seed grown in the Indus Valley.

Sumerian farmers augment agriculture by planting fruit and pistachio trees.

3600 Amerindians discover popcorn.

3100 Egyptian peasants maintain one of the highest standards of living in North Africa.

3000 The Maya of the Yucatán Peninsula chew chicle as a thirst quencher.

India's healers develop Ayurveda, a unified dietary system featuring wellness as its goal.

The use of 40 percent of Babylonian cereal grains to make beer introduces drunkenness and the attendant ills of alcoholism.

The first maritime trade route carries dates, grain, and oil from Babylon to Bahrain and the Harappa culture on the Indus River to barter for sorghum and millet.

2838 Herbalist Shen Nung, the "Father of Chinese Medicine," names preserved soybeans as a curative food.

2600 Episodes from the *Epic of Gilgamesh* urge the hero to feast among good company and good food as a way to enjoy life at its fullest.

2500 Central Asians add the double-humped Bactrian camel and the yak to agrarian investments in meat animals.

2400 The first organized beekeeping begins in clay pipes throughout Lower

Egypt.

2100 Healers in southwestern Asia develop dietary treatments from herbs and honey.

2000 A miniature Cypriot wine jug simplifies infant feeding.

The Maya invent *pozol*, a fermented corn drink.

The orchardists of Crete first cultivate olive orchards.

1700 Persian cooks keep ice sheds and subterranean caches of frozen chunks for making sorbet.

1550 At Luxor, Egypt, the Ebers papyri list chants and herbal dosages that improve blood flow to the heart.

1400 Egyptians build the first physic garden at Karnak and learn the art of espaliering branches along garden walls.

1323 Jars in the tomb of King Tutankhamen attest to the boy king's preference for red wine and Turkish almonds.

1250 Pharaoh Ramses II places the Hebrew Joseph, the vizier of Egypt, over granaries of emmer wheat.

1184 The Greeks pickle soft feta cheese.

1150 The Aztec cultivate *chinampas*, floating gardens that farmers anchored in lake bottoms.

1050 In the earliest era of acorn, barley, and oat refinement in England, hand-grinding dominates much of the homemaker's day.

1000 Persia grows into the ancient world's largest empire and the most noted for abundant dining and charity.

Capitalism from Middle Eastern agriculture enables cities to muster standing armies.

Chinese traders develop sea routes to cassia merchants in Southeast Asia.

The mechanical press raises profits for Iberian and Phoenician olive growers.

- 590 Chinese sausage makers develop a complex recipe for long-lived fermented minced meat.
- 551 Zoroastrians boil gift eggs to celebrate the New Year and to honor the birthday of Asho Zarathushtra, the Persian sage and founder of the faith.
- 550 Samian mathematician Pythagoras of Croton, the “Father of Vegetarianism,” sets the example of healthful eating for his disciples.
- 538 The book of Leviticus begins the codification of Jewish kosher laws.
- 500 The Chinese turn soybean mold into an antibiotic. Pythagoreans invent dietetics for Olympic athletes.
- 450 The Greek poet Philoxenos describes cheesecake, made with curdled milk and honey.
- 428 Herodotus investigates the grain production on land watered annually by the Nile River’s overflow.
- 360 Hippocrates, the Greek “Father of Medicine,” proposes desalination by straining boiled water through a cloth bag.
- 332 Alexander the Great serves iced fruit ades to Macedonian soldiers.
- 323 Most Greeks ridicule the importation of Persian food fads.
- 300 The Indian Kautilya’s *Arthashastra* (*Statecraft*) authorizes the penalizing of marketers who adulterate food. For longevity, the Chinese *Tao-te Ching* (*The Classic Way*) recommends eating herbs, mushrooms, nuts and seeds, and seaweed.
- 200 Roman buyers solve their national wheat crises by looking to Berbers in Numidia for emergency supplies. Chinese cooks ferment seasonal fish and mix rice with frozen milk for an early sherbet.
- 164 During the Han dynasty, scholar Prince Liu An experiments with bean curd to make the first tofu.
- 162 Roman cuniculture and the invention of the capon circumvent the fattening of hens, forbidden by the Lex Faunia, an austerity law limiting gluttony.
- 146 The concept of suppressing future agriculture takes shape in Pope Boniface VIII’s plowing and sowing of the town of Palestrina, Italy, in salt.
- 125 China establishes commercial relations with Persia, which dispatches up to ten eastern expeditions per year over the Silk Road.

- 55 Britons in the Wey Valley of south-central England accept Roman watermills as a shortcut to producing flour.
- 54 In Britannia, Julius Caesar discovers venues selling sharp cheddar cheese.
- 52 On the march of Roman legions into Gaul, provisioners take along the pheasant, a source of eggs and meat.
- 27 The Roman Empire generates the first international cuisine.

C.E.

- 30 The Roman Emperor Tiberius's garden staff plants Armenian gherkins in portable barrows, forerunners of container gardening.
- 35 Apicius compiles *De Re Coquinaria (On Cookery)*, making Rome one of the few ancient cities to have codified its cuisine.
- 70 As an act of dominance in Palestine, the Emperor Titus orders Roman legionaries to fell olive groves.
- 77 Encyclopedist Pliny the Elder's *Historia Naturae (Natural History)* warns of adulterated grain from Tunisia and recommends grapes as integral to a healing diet.
- 100 The Aztec and Maya revere cacao beans as aphrodisiacs, food, money, and symbols of deity.
- 190 Greek table customs separate dining from drinking bouts.
- 390s In Rome's declining days, after the failure of taxation and the economy, food transportation ceases.
- 410 Alaric I ransoms Rome in exchange for 1.5 tons (1.4 metric tons) of pepper, the prime ingredient in Gothic sausage.
- 476 Christian convents and monasteries engage in beekeeping, taking over the apiaries once maintained by Roman farmers.
- 500 Across the Mediterranean and Polynesia, the coconut contributes a form of food currency.
- 534 Agroecologist Jia Sixie, a governor in Shandong Province, compiles one of the world's oldest agricultural monographs.
- 638 Bedouins trapped by hunger and epidemic seek help at food rationing

stations at Medina, Arabia.

650 The Koran specifies the table luxuries awaiting those who win favor with God by eating only halal (permissible) foods on Earth.

Arab notables dine on exotic wild foods from Africa.

700 In Toledo, Spain, Arab confectioners introduce marzipan.

794 Frankish King Charlemagne superintends food pricing and standardizes market weights and measures.

800 The Japanese begin regular hunts for whale meat, which they value as a luxury food.

840 *De Cultura Hortarum (On Gardening)*, by Walafrid Strabo, a Frankish monk, prioritizes cures for the stomach, the “king of the body.”

875 When a rebellion threatens Henan Province with a military coup, hungry Chinese soldiers turn to cannibalism.

900 Arab insurgents in Iberia introduce the Spanish to Jordanian and Lebanese dishes.

Christian monks in Paris revive Roman technology for processing mustard.

1010 Persian historiographer Firdawsi’s *Shahnameh (The Book of Kings)* balances sober laws and moralizing with commentary on merry Zoroastrian feasting.

1075 Jewish nutritionist Symeon Seth’s *On the Properties of Foods* illustrates Byzantine interest in diet and cuisine.

1086 England supports 6,000 milling operations. **October 1097** Crusaders ravage Antioch, Syria, for edible plunder.

1099 Returning crusaders bring the recipe for gingerbread to Europe.

1100 The Japanese domesticate quail as a source of attractive entrées and tiny eggs, exotic plate adornments, and street food.

1152 Hildegard of Bingen, a German abbess, incorporates aromatic plants, spices, and wines in her *Physica (Medicines)* and advises correct dosages of simples for various diseases.

1159 Among German grain dealers in Lübeck, formation of the Hanseatic

League stabilizes prices by evening out food gluts and compensating for crop failures.

1190 The Japanese tea cult, begun by Zen monks, symbolizes social order.

1200s On the eve of the Persian New Year, Iranian cooks make fine egg noodles.

1200 The Inca of the Andes in Bolivia and Chile propagate quinoa.

1215 Genghis Khan credits koumiss, yogurt made from mare's milk, with boosting the efficiency of his soldiers, who conquered Mongolia.

1226 Baghdad cookbook compiler Mohammad Ibn al-Hasan proclaims gastronomy the height of the noble life.

1245 London's first pharmacy stocks ground pine nuts and colored sugar flavored with attar of roses and violets for spicing wine.

1260 Huou, Chinese chef of Kublai Khan, originates fusion cuisine.

1275 In Tibet, Marco Polo observes the stamping of salt cakes with the khan's imperial logo as a form of currency.

1300s Mongol nomads teach the Chinese *kao* cuisine, toasting kebabs over charcoal grills. To save energy, Japanese families warm their feet on the charcoal pot that cooks their dinner.

1350s With the liberality of the coming Renaissance, diners achieve some choice in their food intake.

1354 Travel writer Ibn Battuta notes that late medieval Arab dining follows a regimented social order.

1441 Korean inventor Jang Yeong-sil's rain gauge and water gauge enable farmers to compute the best allotment of stored water.

1486 When the Spanish learn about a four-day Aztec human flesh-eating festival, they coin the term *cannibal* to indicate a revolting blood crime.

October 28, 1492 In Cuba, Christopher Columbus encounters the potato, which reminds him of the taste of chestnuts.

December 26, 1492 After the Taíno of Santo Domingo offer Columbus chili peppers, he plans to deliver them to Spain by the shipload.

April 2, 1494 In the West Indies at Santo Tomás, Christopher Columbus introduces European food technology by building a gristmill.

July 8, 1497 Portuguese voyager Vasco da Gama redirects the Arab-Venetian spice monopoly from the Spice Road to a sea route around

Africa.

1500s Spanish colonists add milk products to the largely vegetarian Aztec regimen.

July 7, 1503 At Jamaica, Christopher Columbus makes another culinary discovery for the Europeans, a wild turkey.

November 7, 1504 Christopher Columbus arrives back in Spain with details of Jamaican style barbecuing, the first source of chocolate seen in Europe, and samples of chili pepper and Jamaican allspice.

1511 Explorer António de Abreu secures a Portuguese monopoly on spices from Indonesia, Ceylon, and Malabar, India.

August 1519 Spanish observers note the consumption of cacti among the Nazca of Peru and the Maya in Tlaxcala, Mexico.

Aztec King Montezuma II introduces invader Hernán de Cortés to New World foodstuffs—beans, cherries and figs, corn cakes, fish, and roast turkey.

November 8, 1519 The soldiers of Hernán de Cortés readily adopt avocado, beans, corn, pineapple, squash, sweet potatoes, tomatoes, and tomatillos and relish foaming mugs of hot chocolate, spiced with chilies and vanilla.

1520 Spanish chronicler Bernal Díaz writes of shaping corn tortillas into tacos that diners filled with pork and dipped into clay dishes of *mole* (sauce).

1521 Portuguese voyager Ferdinand Magellan takes corn and tomatoes to the Philippines.

In the North American Southwest, Catholic missionaries outlaw the eating of hallucinogenic mushrooms and peyote.

1533 Catherine de' Médici introduces Tuscan cuisine to the French.

1534 French explorer Jacques Cartier learns from the Algonquin of Montreal how to cure scurvy with plants rich in vitamin C.

1535 Peruvian settler María de Escobar introduces the cultivation of barley, lucerne, oats, and wheat in the Andes Mountains.

May 1535 In Baja at La Paz Bay, Hernán de Cortés introduces Spanish grapevines, the beginnings of the Central American wine industry.

1542 Oxford-trained physician Andrew Boorde recommends breakfast for English day laborers.

At the end of Europe's longest foray into native America to date, Hernando de Soto's expedition proves the value of dried fruit, ground corn, and nuts to future conquistadors.

1550 Spanish explorer Gonzalo Jiménez de Quesada introduces Iberia to the Colombian potato, which ultimately saves Europe from famine.

1559 Spanish historian Bartolomé de Las Casas extols peanuts and the Caribbean pepper as indispensable to Aztec cookery.

1578 In Baffinland, the Canadian Eskimo store fish and meat under stone cairns, a method of supplying Arctic males on their return treks from hunting grounds.

1585 Italian botanist Castor Durante compiles an A-to-Z study of more than 900 plants and their value to nutrition and healing.

1591 Venetian botanist Prospero Alpini introduces European date palms to the date palm, a staple Egyptian food and a source of wine.

1599 In Leiden, Holland, French botanist Jules Charles de L'Ecluse builds the first green house.

August 1607 The first Christian harvest festival, held at the Popham colony in Maine, predates the American custom of Thanksgiving.

1617 Peruvian ethnohistorian Garcilaso de la Vega enlightens Europeans about the New World diet.

1620s When moralist William Vaughan settles in Newfoundland, he inveighs against alcohol consumption for deforming fetuses.

1622 British beekeepers in Virginia spread the European bee and honey-making techniques to the Americas.

February 20, 1627 Dutch settlers on Barbados initiate the raising of poultry and the planting of sugarcane from Surinam.

1643 Roger Williams observes how Atlantic Coast Indians carry corn in burden baskets as travel food and secure cornmeal in leather belts.

- 1644 Chinese Manchus ensure agrarian abundance by improving efficiency of flood control and grain storage.
- 1653 Naturopath Nicholas Culpeper compiles home recipes to treat common ailments in *The Complete Herbal*.
- 1660 The restoration of Charles II to England's throne reinstates the ritual gala, where royalty and courtiers dine at public feast tables while their subjects watch in silence.
- 1670 Planters in Barbados and Jamaica establish the first New World growth of Africa's green wealth in black-eyed peas, okra, and greens. Formation of the Hudson's Bay Company earns profits for Great Lakes Indian women, who taught white males to make pemmican, Canada's first processed food.
- 1687 The supervision of food service on slave transport vessels reduces the mortality rate from 33 percent to 13 percent.
- 1690s Portuguese traders introduce manioc in Angola and the Congo.
- 1700s China's Qing emperors enter the golden age of famine relief.
- 1704 Creole cuisine of Louisiana Territory evolves from the blending of African okra and Choctaw sassafras leaves (*filé*) with classic French and Italian gastronomy.
- 1714 Scots-French explorer Amédée François Frézier introduces Europeans to the Pacific Coast strawberry.
- 1728 Germans near Weisbaden bottle and cork seltzer water and sell 600,000 stoneware jugs per year.
- 1730 Virginia slaves add African specialties to plantation menus.
- 1749 In North America, the natural crossbreeding of a cow with a buffalo produces sturdier stock to withstand extremes of drought and blizzards.
- 1750s Sweet French dessert cheeses and festive custard and berry ice cream recipes in London cookbooks migrate to colonial America.
- 1750 Portuguese monks complete a unique kitchen at Alcobaca Monastery by diverting the Alcoa River through the premises.
- 1753 The concern of James Lind, a Scots physician, for diet and pure drinking water improves well-being for the Royal Navy.
- 1757 Swedish ethnographer Carolus Linnaeus, the "Father of Biological Taxonomy," studies the risks of hunger among commoners.

- 1761 Agronomist Jared Eliot of the Connecticut Colony aids farmers in producing greater wheat yields. Prussian analytical chemist Andreas Sigismund Marggraf produces loaves of beet sugar, a slave-free commodity.
- 1769 In Tahiti, English sea captain James Cook combats shipboard scurvy by dispensing malt wort, portable soup, and sauerkraut.
- 1771 In Bengal, India, British mismanagement of rice distribution allows profiteers to elevate prices to ten times the normal cost and thugs to seize food shipments for sale to the highest bidder.
- May 10, 1773** The Tea Act enables the British East India Company to ship Chinese tea duty-free to the American colonies, thus underselling colonial food marketers and, in 1776, fomenting the American Revolution.
- 1783 The Hudson's Bay Company spreads its control of trade among the Cree, Eskimo, Ojibwa, and Slave from the Dakotas to Ontario and Quebec.
- 1785 French anatomist Louis Jean-Marie Daubenton notes the slowing of digestion in aging humans and recommends vegetarianism to prevent dyspepsia and flatulence.
- 1788 English colonists in Australia reject island wild food.
- October 17, 1788** Letters from French explorer Jean François de Lapérouse acquaint the Western world with the native foods and diet of Pacific Coast aborigines.
- 1794 Creole planter Jean Étienne de Boré of New Orleans founds the Mississippi Delta sugar industry.
- 1796 Under taoism, Chinese poet Yuan Mei, author of *Shih Tan (The Menu)*, advocates inspection of pigs and chickens for disease.
- 1797 Thomas Malthus's *Essay on the Principle of Population* warns that the global population will outpace the food supply.
- 1798 British Crown colonies rule world food commerce.
- 1802 Herb collector Jules Paul Benjamin Delessert introduces beet sugar refining to the Napoleonic Empire.
- 1807 Frederic Tudor of Boston acquires a monopoly on the ice trade to the West Indies.
- 1809 French inventor Nicolas Appert perfects vacuum canning.

- 1820s Andalusian horticulturist Francisco de Paula Marín introduces 65 edible species to Hawaii.
- 1820 Analytic chemist Friedrich Christian Accum, apothecary to George III, issues *A Treatise on the Adulterations of Food and Culinary Poisons*, a jeremiad, subtitled “There is death in the pot.”
- 1821 The Hudson’s Bay Company spans North America and dominates the food trade.
- 1824 Mary Randolph compiles America’s first cookbook, *The Virginia House-Wife*.
- 1825 Protosociologist Jean Anthelme Brillat-Savarin issues the gourmet’s bible, *Physiologie du Goût (The Physiology of Taste)*, which captures the complex stimuli of the table.
- 1830 Australian colonists export salt beef to England.
- 1832 In Charleston, South Carolina, American inventor John Mathews enhances the popularity of bottled carbonated drinks.
- 1833 Marie-Antoine Carême’s death leaves unfinished his five-volume encyclopedia *L’Art de la Cuisine Française (The Art of French Cuisine)*, a compendium of baroque table settings, menus, and recipes.
- 1834 The British East India Company launches a fleet of clipper ships to speed Indian foods to Europe and the Americas.
- 1837 Lea & Perrins offers Worcestershire sauce, a liquid condiment fermented at apothecary shops, as an appetite stimulant.
- February 10, 1840** French club chef Alexis Soyer caters a breakfast for 2,000 following Queen Victoria’s coronation.
- 1842 The Treaty of Nanking opens five Chinese ports to trade with Great Britain.
- 1843 Food historian Louis, Marquis de Cussy declares gastronomy and hospitality as tokens of a nation’s greatness.
- 1845–1852 The Irish Potato Famine results during English domination of starving smallholders.
- September 30, 1847** English abstainers from meat form the Vegetarian Society at Ramsgate.
- 1848 The Pennsylvania Dutch publish America’s first ethnic cookbook, *Die Geschichte Hausfrau (The House wife’s Tale)*.

- 1850 Thomas Wakley, editor of *The Lancet*, England's primary medical journal, establishes the Analytical and Sanitary Commission, which vilifies chemical enhancement of 2,500 foodstuffs.
- 1851 The importation of Chinese laborers to Australian cotton plantations and gold mines introduces Asian vegetables to island cuisine.
- 1852 Advances in rotary printing make catalog advertising profitable and adaptable to food commerce, beginning with wines from Aristide Boucicaut's Paris store Au Bon Marché.
- 1861 King Kamehameha IV imports honeybees to Hawaii, experiments with hybrid rice seed, and adds a waterworks to ensure even distribution of fresh water.
- 1862 In the United States, contract farming replaces subsistence farms with more advantageous methods of sharing risk in producing eggs and meat. Gail Borden's production of canned milk in vacuum pans enlarges the pantry with stable, safe milk and dairy products.
- 1863 In Richmond, Virginia, Mary Jackson leads women from the Belvidere Hill Baptist Church in a two-hour bread riot at Capital Square.
- 1864 British tea boutiques become a London fad. 1867 German chemist Justus von Liebig's Registered Concentrated Milk Company in London ships artificial mother's milk to American and European markets. Pharmacist Henri Nestlé of Vevey, Switzerland, formulates baby food from sweetened condensed milk and malted wheat rusks.
- 1869 Tabasco pepper, a local specialty from Avery Island in Iberia Parish, Louisiana, becomes a regional condiment. French chef Felix Urbain Dubois popularizes the pre-sentation of dinner in separate courses on individual plates rather than grand displays. 1870 The grapefruit thrives as a commercial crop in Orange County, Florida.
- 1872 Naturalist Charles Darwin's theories of the struggle, adaptation, and survival of living organisms revolutionize science.
- October 1872** The cultivator of the Red Delicious apple, Indiana fruit grafter Jesse Hiatt, propagates one of the world's preferred health foods.
- 1873 North American corn cultivation expands to more than 34 million acres (14 million hectares).
- 1876 The F. & J. Heinz Company bottles and markets tomato ketchup.

- 1877 The Quaker Mill Company of Ravenna, Ohio, makes cooked oats a staple of the American breakfast menu.
- 1878 The North American buffalo are too sparse in number to warrant tracking.
- February 2, 1880** The freighter *Strathleven* brings the first frozen meat from Melbourne and Sydney, Australia, to London.
- 1880s English caterer Agnes Marshall turns the food business into a successful conglomerate.
- 1884 Naval physician Takaki Kanehiro treats beri-beri, a disease caused by too little vitamin B1 in the rice-heavy diet of Japanese sailors.
- 1890 Georges Auguste Escoffier, the “Father of Modern French Cuisine,” brings order to public dining with the first à la carte menu.
- 1893 Richard Warren Sears of Stewartville, Minnesota, prints the first Sears, Roebuck catalog, initiating the world’s most successful groceries-by-mail service.
- 1895 At the Cordon Bleu cooking school in Paris, chefs prepare the ornate, refined menus of the era.
- 1896 Dutch industrialist Martinus van der Hagen’s Nutricia foods first commercialize prepared infant foods resembling mother’s milk.
- 1897 Freda Ehmman initiates the California ripe olive curing industry.
- 1900s American Reform Judaism abandons kosher rules, which tend to isolate Jews within mainstream society.
- 1901 Biochemists Ellen Swallow Richards and Alpheus Grant Woodman warn of unscrupulous dealers in adulterated foods.
- 1906 The U.S. boom in breakfast cereals brings fame to Battle Creek, Michigan, from which the Kellogg brothers ship 1,000 cases of bran, corn, and wheat flakes a day.
- June 30, 1906** President Theodore Roosevelt signs the Pure Food and Drug Act into law, requiring the accurate labeling of foods and drugs and prohibiting interstate trade in adulterated foods.
- 1907 Henry Perry, a Tennessee-born steamboat cook, initiates barbecuing in Kansas City, Missouri.
- 1908 Japanese chemist Kikunae Ikeda isolates monosodium glutamate, a salt that mimicks *umami*, the taste of meat.

- 1910s** Fructarianism gains popularity as a solution to human drudgery.
- 1911** Agronomist Elizabeth Coleman White hybridizes blueberries at a plantation in Burlington County, New Jersey. 107 brands of cornflakes are available to U.S. shoppers.
- 1912** Salish author Mourning Dove reports on the annual hunger that struck native families each February in Washington State.
- 1914** The Hudson's Bay Company distributes wheat and frozen meat to Belgium and France.
- August 1914** The Panama Canal enables oceangoing vessels to deliver food cheaply, dependably, and speedily.
- 1915** A small ice compartment in Frigidaires enables homemakers to insert their own metal ice trays for freezing.
- 1917** George F. Doran patents the first U.S. nitrite curing process, a system that enhances meat savor. In lieu of currency, isolated Russian peasants exchange pots of jam for goods and services.
- October 28, 1919** The U.S. National Prohibition Act, also known as the Volstead Act, prohibits the sale of alcohol.
- 1920** Colombia and Panama develop resilient sheep herds. The Hudson's Bay Company in the eastern Arctic at Inukjuak trades in whale blubber and oil and salt fish.
- 1922** West African trade in peanuts makes Alhassan Dantata the region's richest merchant and founder of private enterprise among Nigerian peasants. U.S. Grain Future Acts shield the heartland from grain price instability.
- 1925** Italian agronomist Nazareno Strampelli attempts to free Italy from reliance on imported food.
- 1930** The United States exports \$2 billion per year in farm goods.
- May 1933** The Agricultural Adjustment Act, the first modern U.S. farm bill, pays farmers for not planting and for slaughtering excess livestock to avoid food surpluses.
- 1940s** Plant geneticist Norman Ernest Borlaug introduces semidwarf, thick-stemmed wheat in Chapingo, Mexico, as a means of shortening growing seasons and boosting yield.
- 1940** During rationing, the British minister of food forces dairiers to

slaughter herds to free pastures for growing grain and vegetables. British philosopher Christopher James Northbourne, the “Father of Organic Agriculture,” champions environmental sustainability through traditional farming.

1941 Earle R. MacAusland’s *Gourmet: The Magazine of Good Living* publishes up-to-the-minute commentary on U.S. restaurants and recipes.

1942 U.S. agronomist Gordie Consyntine “Jack” Hanna develops a tomato that can hold up to mechanical picking.

April 1942 The U.S. Air Force launches air relief over the eastern Himalayas to supply Chiang Kai-shek’s Chinese troops.

1943 Price gouging, panic buying, warehousing, wartime inflation, and military provisioning precipitate starvation in rural Bengal, India.

1944 English reformer Donald Watson coins the term *vegan* to describe nonmeat eaters who also reject dairy foods and eggs.

1945 California orchardists field 2 million of botanist Luther Burbank’s hybrid plum trees and distribute fresh fruit and prunes worldwide.

May 1946 Food allotments in Tokyo average only about 520 calories per person, leaving the Japanese to forage for wild food.

June 4, 1946 The U.S. National School Lunch Act guarantees markets for eggs, meat, and milk.

June 28, 1948 The first sortie of 32 U.S. C-47s delivers 80 tons (73 metric tons) of flour, medicine, and milk along with CARE packages to Berlin, Germany.

1949 The U.S. Food and Drug Administration initiates government inspection of processed foods.

1950s Kudo Kazuyoshi, a Japanese master at bamboo implement manufacture, designs creels for draining seaweed, transporting salt for pickling eels, and trapping and storing live fish in water. Television ads spur enthusiasm for Jell-O, TV dinners, and frozen fish sticks and vegetables. The growth of fast food and patio cookouts increases the eating from hand of buns and rolls with meaty fillings and of fish sticks and kebabs. Hybrid cultivars, drip irrigation, recirculated water, acrylic tunnels, and plastic film for quonset huts increase possibilities for the global gardener and university research centers. Gourmet food co-ops

welcome imported exotica and wild foods.

1950 Gastronomer Elizabeth David's *A Book of Mediterranean Food* popularizes the sensual pleasures of regional dining.

1952 Advertisers introduce consumers to the first diet soft drink.

1955 John H. Davis, a Harvard professor of agriculture and marketing, creates the term *agribusiness* to describe the evolution of subsistence farming into a commercial complex.

1956 The U.S. La Leche League encourages mothers to return to natural breastfeeding for at least a year.

1958–1961 China incurs a devastating famine that kills 45 million.

January 1, 1958 The U.S. Food Additives Amendment identifies 700 safe food substances and bans cyclamates, lead, and halogenated compounds.

1960s New Orleans chef Leah Chase creates a meatless Creole special for Lent, Gumbo z'Herbes, a puree of mustard greens, spinach, and turnips based on West African pot greens and the French *potage aux herbes*.

1960 U.S. politician George McGovern proposes a consortium of civilian-led food aid programs organized by the United Nations. Geneticists introduce miracle seeds and chemical fertilizers into the Indian subcontinent. French food critics Henri Gault and his colleague Christian Millau revive the term *nouvelle cuisine* for pared down, uncomplicated menus.

1961 To stimulate world trade and global prosperity, 34 countries convene the Organisation of Economic Cooperation and Development.

February 11, 1963 On WGBH-TV in Boston, Julia Child debuts as *The French Chef*.

1970s The effect of fast-food psychology on students, office workers, and drivers erodes the notion of the home breakfast table. Gourmet cuisine abandons cultic French dishes for international foods. Tokyo greenhouses yield marketable vegetables. The U.S. Food and Drug Administration bans time-release diethylstilbestrol (DES) pellets from ear implants in cattle and sheep.

1970 In the United States, no commercial grower picks tomatoes by hand.

1971 The U.S. Food and Drug Administration recommends the addition of iron to breakfast cereals and baby foods.

October 12–16, 1971 Reza Pahlavi, the shah of Iran, recalls the splendors of

ancient Asia by hosting an elaborate international celebration of the 2,500th anniversary of the Persian Empire.

1972 The U.S. Department of Agriculture establishes the Women, Infants, and Children Program, which distributes iron-fortified infant formula and cereal to some 88,000 applicants. The U.S. Food and Drug Administration's studies of nitrosamines prove that bologna, corned beef, hot dogs, pepperoni, and salami contain carcinogens.

1973 The Endangered Species Act protects imperiled amphibians, birds, fish, and mammals, as well as crustaceans and mollusks. The first genetically modified bacteria prove the feasibility of engineering animal life.

1975 Seattle gastroenterologist Walter Lyle Voegtlin promotes a Stone Age, or Paleolithic, diet as the ideal sustenance for human wellness and stamina. Ancel Keys and Margaret Haney Keys's *How to Eat Well and Stay Well the Mediterranean Way*, a commentary on degenerative ills, is published.

1975–1979 Global emergency aid to Cambodia feeds refugees displaced by tyranny and mass killings under Pol Pot and the Khmer Rouge.

1976 Chef James Beard enlivens service at Windows on the World, a tower restaurant in the World Trade Center.

1980s Food snobbery elevates pink peppercorns, pineapple chutney, and sushi as the exotica of the moment.

1983 British biochemists create a high-fiber, low-starch bread intended to control appetite and cholesterol while emulating the mouthfeel and satisfying quality of ordinary bread.

1984 Agronomist Norman Borlaug introduces intense monoculture in famine-plagued Ethiopia.

1986 The Slow Food initiative begins with a protest of a McDonald's opening along Rome's Spanish Steps. Restrictions enforced by the International Whaling Commission place a moratorium on the overhunting of whales. British families began deserting the traditional beef roast this year, when bovine spongiform encephalopathy, or mad cow disease, first threatens meat eaters and spreads to 14 European nations.

1988 Studies of breast milk at Baffin Island and Nun-avik, Canada, reveal

methylmercury in seal, walrus, and whale blubber.

1989 The European Union issues a ban on synthetic hormones.

1990s The slang term *grazing* refers to sampling varied finger foods.

July 3, 1992 A multinational effort supplies 179,910 tons (163,178 metric tons) of goods to Sarajevo, Bosnia.

1993 The U.S. Food and Drug Administration mandates nutritional labeling on all edibles.

1994 A Colorado firm hybridizes and patents the Enola bean, a yellow legume originated in Mexico.

1996 To stave off malnutrition, French pediatrician André Briend concocts Plumpy'nut, a nutritive peanut paste of milk, oil, peanuts, and sugar.

1998 In New Delhi, India, philosopher Vandana Shiva begins a national movement to empower women in the green movements in Africa, Asia, Europe, and Latin America. Filipina ecofeminist Neth Daño campaigns against bioengineered foods.

1999 Ecologist Dickson Despommier at Columbia University creates the Genesis system, a soilless root enclosure misted with water and nutrients.

2000s The world's largest green house, the Eden Project, opens in Cornwall, England. 25 percent of American cornfields produce bioengineered grain. U.S. meat inspectors apply the Hazard Analysis and Critical Control Point law to meat testing by using scientific measures of pathogens. U.S. teens gravitate toward veganism.

September 22, 2000 In the United States, Kraft Foods recalls \$10 million worth of genetically modified foods.

2001 Walter Willett, chair of the department of nutrition at Harvard School of Public Health, blames a heavy carbohydrate diet for causing diabetes, obesity, and early death.

January 2001 Dole Food Company, the world's largest fruit and vegetable seller, enters organic marketing.

2002 Pfizer, a British firm, pays royalties for hoodia, an appetite suppressant discovered by the Khoi and San bush people of South Africa. During guerrilla warfare in Angola, women network the transport and caching of edibles. The Cuny Center honors engineer Frederick C. Cuny by expediting disaster relief with practical solutions.

- 2003** AquaBounty Farms of Waltham, Massachusetts, sells the first chinook salmon raised on growth hormones.
- 2004** Specialized seagoing vessels increase the profits for investors in the food trade.
- July 29, 2005** The United Nations begins a 23,000-ton (21,000-metric-ton) food airlift to Maradi, Niger.
- August 23, 2005** After Hurricane Katrina devastates the Mississippi Delta coastline and farms, chef John Besh joins other food specialists in restoring Louisiana's economic basis.
- 2005–2011** Africa's agricultural commerce increases by 92 percent.
- 2007** Allura red dye comes under scrutiny in England for lowering IQs in children and increasing hyperactivity.
- 2008** The Mayo Clinic announces that the Mediterranean diet reduces risk for Alzheimer's disease, breast cancer, and Parkinson's disease.
- 2009** 62 percent of U.S. farm earnings—\$180.9 billion— come from the government. The United Kingdom and the United States restore subsidies and erect barriers to free trade with Australia and New Zealand.
- 2010** In Australia and Canada, urban aquaponics reduce the distance that crops travel to market. Food researchers find saffron beneficial in the treatment of Alzheimer's disease, macular degeneration, and retinitis pigmentosa. The United Fresh Produce Association Foundation of Washington, D.C., campaigns to open a salad bar in every school. The documentary *Kuru: The Science and the Sorcery* dramatizes the danger of cannibalism, which can cause kuru, a degenerative brain disorder related to mad cow disease. Peppersmith reintroduces minted chicle gum in Great Britain and Holland under claims that sweetening with xylitol remineralized damaged tooth enamel.
- January 1, 2010** The International Food Policy Research Institute predicts that environmental degradation and water mismanagement could reduce sustainability in Burkina Faso, Chad, and Niger.
- April 2010** Environmental researchers link the polyethylene terephthalate in soft drink bottles to endocrine disruptors.
- June 30, 2010** The Center for Science in the Public Interest recommends banning yellow food dye for its disruption of children's behavior and for

possibly causing cancer.

July 2010 The United Nations General Assembly declares water justice and sanitation to be human rights.

2011 The United Nations's Food and Agriculture Organization predicts that Africa holds the key to world food security. In the United States, empty calories cost less than nutritious food, tempting the poor to spend food dollars on beer, carbohydrates, and snacks.

March 2011 China forbids millers from bleaching wheat flour.

March 15, 2011 At Magaria, Sudan, 6,200 starving children require hospitalization.

May 2011 The Chelsea Flower Show promotes edible flowers.

June 2011 The U.S. Department of Agriculture issues MyPlate, the second update of the food pyramid, a pictorial guide to healthful consumption.

July 2011 Transgenic fish appear biologically and chemically indistinguishable from native species. **July 25, 2011** A world airlift begins importing emergency rations to Mogadishu and border airports in Dolo, Ethiopia, and Wajir, Kenya.

August 2011 Vandals opposed to genetically modified foods destroy bioengineered wheat warehoused for distribution to victims of famine in Somalia.

August 29, 2011 Social media and the Canadian government network to raise famine awareness worldwide.

October 2011 The 21-nation Asia-Pacific Economic Cooperation pledges to create the world's largest free-trade area.

February 29, 2012 North Korea bargains for food aid by agreeing to a moratorium on nuclear development.

Appendix: Herbal Foods and Uses

Herb	Food Use	Curative Use, Health Benefits
agar	soup, sauce, jelly, dessert	constipation, malaise, obesity
alecost	flavoring, soup, salad, game, poultry, stuffing, fruitcake, beer	cold, congestion, cramp, pain, sunburn
alexander	flavoring, fritters, salad, stew, fish, candy	poor appetite
alfalfa	tea	arthritis
almond	candy, liqueur, cake, marzipan	constipation, cough, sunburn
angelica	crystallizing, syrup, tea, beverage, fruit salad, ice cream	flatulence, nausea, rhinitis, indigestion
anise	fruit salad, garnish, soup, cake, bread, pie, candy, sauce, cheese, pickles, curry, fish, liqueur, stew	colic, congestion, cough, nausea, poor lactation, flatulence
artemisia	stuffing, tea	infection, rheumatism
arugula	syrup, snack seed, salad, sauce, vegetable, garnish	cough
balm	tea, beverage	fever, cold, headache, cramp
balsam	flavoring	bleeding, healing, kidney disease, worms, scabies, hemorrhoids
bamboo	salad, garnish	edema, fever, tension
basil	salad, vegetable, soup, flavoring	insomnia, muscle cramp, rhinitis, sinusitis, fever, nausea, dysentery
bay	<i>bouquet garni</i> , marinade, stock, <i>pâ té</i> , stuffing, curry	indigestion, rheumatism, sprain
bearberry	tea	urinary and venereal disease
berberis	tea	burn, infection, worms, tuberculosis,

beech	nut, oil, potherb	diabetes
benzoin	flavoring, beverage	sores, healing, croup, laryngitis, chap
bergamot	salad, tea, beverage, wine, stuffing, jam, jelly, meat, milk	congestion, flatulence, insomnia, menstrual pain, sore throat
betel palm	nut, salad	malaise, indigestion, gum disease, tapeworm
bistort	roasted rhizome, soup, flour, salad	enteritis, dysentery, skin irritation, bleeding
black birch	candy, oil	sore muscles, pain
black locust	tea	anemia, headache, stomach pain
black mustard	salad, condiment	bronchitis, congestion
blackberry	beverage, vinegar, wine, jelly, pudding, ice cream, meat sauce	edema, skin ulcer, sore throat, urinary infection
boneset	tea	flu, malaria, kidney disease, typhus, sweating
borage	salad, candy, garnish, beverage, yogurt, cheese, pickles, sandwich, stuffing, tea, wine	bruise, dry skin, fever, urinary pain, tension, inflammation
bouncing bet	beer	constipation, acne, boil, poison ivy, kidney pain
buckthorn	broth	constipation, bleeding, wart
bugloss	cordial, candy	headache, inflammation, malaise, rhinitis, tension
burdock	salad, vegetable, soup	rheumatism, gout, leprosy, sores
burnet	salad, butter, garnish, vegetable, vinegar, dressing, beverage	enteritis, dry skin, edema, bleeding, rheumatism, hemorrhoids, poor appetite, gout, plague, indigestion
calamint	tea	bruises, colic, cough, flatulence
calendula	food coloring, flavoring, cheese, yogurt, butter, cake, milk, bread, fish, game, garnish, fruit salad,	cracked nipples, halitosis, inflammation, sores, varicose veins, wound

	pâté, stew	
camphor tree	veneer, candy, soap, soft drink, potpourri	hysteria, heart pain, epilepsy, bruise, rheumatism, emphysema, gout, sprain, cold
cañ aigre	tea	sore throat, enteritis, bleeding
caraway	meat, game, soup, bread, cake, biscuit, pie, fruit, cheese, snack food, candy, liqueur	flatulence, halitosis, spasm, indigestion, poor appetite
catnip	meat, tea, salad, herb	bruise, colic, fever, toothache, insomnia, headache, upset stomach
celery	soup, stock, sauce, salad, oil flavoring	malaise, flatulence, scurvy, jaundice
chamomile	tea	arthritis, chapped skin, dandruff, eczema, gingivitis, indigestion, insomnia, malaise, menstrual pain, morning sickness, sore eyes, teething, windburn
chaparral	tea	cough, arthritis, cancer
chat	tea	malaise
chervil	omelette, salad dressing, roast fowl, eggs	congestion, poor appetite, poor circulation
chickweed	salad, vegetable, herb	constipation, eczema, hemorrhoids, inflammation, psoriasis, skin disease, sores, ulcer, tumor, sore eyes
chicory	salad, pickles, vegetable, beverage, coffee flavoring, soup, stew	edema, constipation, gallstone, inflammation, urinary infection, poor lactation, jaundice, kidney stone, swelling
Chinese lantern	jam, jelly	kidney stone, gout, infection, typhoid, worms
chives	salad, soup, poultry, meat, potato, cooked vegetable, fish, spread	congestion, hypertension
chocolate tree	candy, beverage, soap	skin irritation, burn
clarv	wine, flavoring, potpourri,	eye irritation, upset stomach, splinter

chary	beer, omelet, soup	eye irritation, upset stomach, spindles
cleavers	coffee or tea substitute, soup	kidney stone, bladder pain, wounds, scurvy, malaise, psoriasis
clove	spice, flavoring, tea	toothache, nausea, athlete's foot, hernia, flatulence, enteritis
clover, red	vegetable	insomnia, spasm, acne, cough, cold, burn
clover, sweet	cordial, sausage, meat, stuffing, beef, cheese, tea	cut, headache, indigestion, infection, pain, sore eyes, wound, spasm
coca shrub	beer	high blood pressure, pain, malaise
coffee	beverage, candy, flavoring	heart pain, malaise, headache
coltsfoot	salad	asthma, cough, flu, rhinitis
comfrey	tea, salad, vegetable	cough, diaper rash, dry hair, infection, skin damage, varicose veins, wound, bronchitis, psoriasis, broken bone
coriander	stir-fry, soup, sauce, cookies, vegetable, poultry, aperitif	indigestion, rheumatism, soreness, tension
cotton seed	oil	childbirth pain, menstrual pain
couch grass	coffee or tea substitute, grain	urinary disease
cow parsnip	vegetable, salt substitute	headache, toothache, acne, epilepsy
cowslip	jam, wine, pickles, salad, dessert, stuffing, vegetable	cough, headache, insomnia, tension, wound
cress	salad, sauce, garnish	infection
culver's root	tea	blood thinner, tuberculosis, enteritis, liver disease, constipation
cup plant	tea, chewing gum	cold, neuralgia, bleeding, menstrual flooding, compress
dandelion	tea, salad, wine, coffee	constipation, dry skin, eczema, edema, gout, hypertension, insomnia, kidney or gallbladder pain, sallow skin
dianthus	salad, pie, sandwich, flavoring, jam, vinegar,	tension

	wine, syrup	
dill	salad, pickles, apple pie, salmon, herbed butter, oil, mayonnaise, mustard, soup, flavoring, bread	colic, flatulence, hiccups, indigestion, stomach cramp
dittany	tea	fever, kidney stone, stomach cramp
dock	salad	toothache, itch, acne
dog rose	syrup, jelly	rabies, skin inflammation, fever, poultice
elderberry	wine, syrup	cough, skin inflammation, constipation, congestion, kidney disease
elecampane	candy, wine	indigestion, congestion, asthma, spasm, inflammation
English holly	tea substitute	jaundice, malaria, fever, malaise
eucalyptus	syrup	bronchitis, infection, asthma, cough
European alder	smoking fish or meat	inflammation, fever, lice, scabies
European chestnut	nut, flour, soup, bread, cake, oil	enteritis, cough, cold, inflammation
evening primrose	vegetable, pickles, salad, aperitif	hypertension, menstrual pain, multiple sclerosis
eyebright	tea	red or sore eyes, eyewash, inflammation
fennel	fish, salad, vegetable, bread, tea, herb	chapped skin, constipation, flatulence, infection, obesity, sore eyes, toxicity, cataract, poor lactation, cough, blindness
fenugreek	salad, vegetable, roast meat, curry, chutney, spice	bruise, cough, enteritis, poor appetite, poor lactation, flatulence, inflammation, sciatica, swollen gland, tuberculosis, sore throat, impotence, malaise
feverfew	soup, stew, flavoring, tea	arthritis, fever, insomnia, malaise, migraine, sore throat, vertigo, impeded menstrual flow, bee stings,

		hysteria
fireweed	potherb, soup, vegetable, salad, tea substitute	spasm, skin disease, asthma, cough, hiccups
flax	snack food	boil, constipation, inflammation, lung infection
four-o'clock	tea	obesity, joint pain
garlic	salad, dressing, marinade, grilled meat, fish, spread	infection, cough, cold, snakebite, high blood pressure, kidney disease, plague, worms
geranium	sauce, custard, jelly, ices, soup, syrup, jam, vinegar, cake, wine, tea, pâté, fish, pastry, sandwich	dermatitis, dry skin, eczema, edema, premenstrual tension, herpes
ginger	spice, flavoring, tea, oil	cold, flu, cough, hangover, malaise, sore muscle, sinusitis, cramp, kidney pain, flatulence
ginseng	tea, candy	anemia, congestion, cough, malaise, poor appetite, tension, impotence
golden orach	salad, vegetable, soup garnish	gout, jaundice, sore throat
goldenrod	tea	dropsy, bruise, colic, sweating, flatulence, kidney disease
goldenseal	tea	morning sickness, eyewash, stomachache, ulcer, vaginal infection, tuberculosis, cancer
Good King Henry	flour, gruel, vegetable, salad, casserole, stuffing, soup, pie	cough, sores
goosefoot	vegetable, potherb, salad	sores, constipation, anemia, kidney disease
gum arabic	wax, candy	sore throat, enteritis, cough, chap
heather	liqueur, sweetener	snakebite, kidney stone, insomnia, cough
heliotrope	food fragrance	epilepsy, hysteria, cough, convulsion
hibiscus	tea	menstrual cramp, indigestion, asthma

highbush cranberry	jelly, dried fruit	cramp, mumps, spasm, palpitation, childbirth pain
hops	flavoring, beer, salad, soup, vegetable	indigestion, inflammation, insomnia, pain, poor appetite, toothache
horehound	candy, tea	cold, asthma, snakebite, poor lactation, hysteria, jaundice, constipation
horseradish	salad, roast meat, fish, slaw, dip, pickles, cheese, mayonnaise, stuffing	chapped skin, cough, edema, sore muscle, worms, rheumatism, sciatica
horsetail	tea	infection, split fingernail, thin blood
houseleek	salad	burn, corn, cut, sore throat, stings, ulcer, wound
hyssop	tea, seasoning, salad, oil, stew, pâté, pie, soup, pulses, fish, game, liqueur, wine	bruise, cough, indigestion, bronchitis, cut, poor appetite, skin disease, rheumatism
Iceland moss	vegetable	malaise, poor appetite, bronchitis, asthma
Irish moss	thickening, vegetable, stew, jelly	chaf, constipation, sore throat, skin irritation
jack-by-the- hedge	meat, cheese, sandwich, sauce	edema
juniper	pâté, marinade, stuffing, gin, sauerkraut, ham, game dressing, stew	plague, leprosy, cold, worms, dropsy, cystitis, stomachache, sores, scurvy, childbirth pain
karaya tree	dressing, cheese, dessert	infection, constipation
kava	beverage	heart pain, malaise, urinary disease, nerves, infection
kelp	vegetable, salt substitute	asthma, skin irritation, arthritis, constipation, radiation poisoning
khella	toothpicks	heart pain, bronchitis, kidney stone, allergy, asthma
knotweed	meal	skin irritation, kidney pain, hemorrhoids

kola nut	beverage, soft drink	obesity, heart pain, nausea, headache, asthma
lady's bedstraw	cheese, food coloring	insomnia, malaise
lady's mantle	salad	enteritis, menstrual dysfunction, pain
laurel	tea, herb, food fragrance	rheumatism, headache, pain
lavender	candy, garnish, oil	asthma, enteritis, eczema, hypertension, hay fever, headache, insomnia, stroke, nausea, oily hair, sallow skin, sinusitis, sprain, swelling, tension, fainting
lavender cotton	oil	snakebite, infection, worms, itch
lemon	beverage, salad, poultry, stir-fry, baking	congestion, cough, fever, rheumatism, rhinitis, headache, infection
lemon balm	beverage, salad, custard, roast meat	congestion, cough, fever, headache, sores, stings, tension
lemon grass	salad, tea	oily skin, tension
lettuce	salad, soup	allergy, congestion, insomnia
licorice	candy, flavoring, beer, sweetening, tea	congestion, constipation, cough, fever
lovage	meat, pâté, broth, cheese, stew, candy, salad, bread, pastry, poultry, tea, soup, vegetable	edema, rheumatism, menstrual pain, halitosis, flatulence
marjoram	soup, pasta, fish, game, sausage, meat loaf, tea, vegetable, omelette, cheese, stuffing, herb	chill, hay fever, muscle cramp, tension, upset stomach, toothache, itch, snakebite, flatulence
marsh marigold	vegetable, food dye, pickles	wart, rheumatism
marshmallow	cheese, salad, vegetable	burn, cough, enteritis, inflammation, insomnia, skin disease, teething
maté	beverage	malaise, fatigue
mayapple	fruit	liver cancer, constipation
		enteritis. edema. fever. gastritis.

meadowsweet	beer, wine, mead, herb, flavoring, jam, fruit	inflammation, heartburn, pain, tension, ulcer, skin
milkweed	vegetable	asthma, insomnia, ringworm, dropsy, poison ivy, venereal disease
mint	sauce, syrup, vinegar, tea, potato, cream cheese, yogurt, dessert, pastry, candy, garnish, liqueur	acne, enteritis, flu, halitosis, muscle pain, sinusitis, indigestion, morning sickness, nausea, oily hair
moonseed	soft drink	tuberculosis, lymph infection, arthritis, malaise, constipation, kidney disease
mormon tea	beverage	syphilis, cold, fever, headache, sores, burn, bleeding, asthma, sunburn
motherwort	beverage	palpitation, cramp, rabies, childbirth pain, convulsion
mouse-ear	tea	liver disease, intestinal pain, asthma, sore throat, nosebleed
mountain ash	pie, jelly, jam, wine	enteritis, hemorrhoids, scurvy, inflammation
mugwort	tea, herb	sore feet, childbirth pain, palsy, menopause, tension, epilepsy
mulberry	jam, wine	constipation, edema, weakness
mullein	liqueur	congestion, cough, earache, hoarseness, migraine
mustard	spread, flavoring, eggs, mayonnaise, sandwich, salad, pickles, syrup	arthritis, chapped skin, chill, pain, laryngitis, pleurisy, congestion, inflammation, sciatica, poison
myrtle	beer, soup, stew, grilled and roast meat, barbecue, flavoring	bruise, hemorrhoids, infection, psoriasis, sinusitis, upset stomach
nasturtium	salad, flavoring, garnish, sauce	rhinitis, scurvy
nettle	salad, soup, beer, tea, vegetable	acne, edema, indigestion, scrofula, bleeding, gout, oily skin, inflammation, menstrual pain, tuberculosis

oats	cereal, flour, beer	indigestion, spasm, skin inflammation, depression, high cholesterol
onions	vegetable, herb, flavoring, salad, pickles	high blood pressure, wart, acne, infection, flatulence, kidney disease, diabetes, pneumonia
oregano	pizza, chili, eggs, cheese, vegetable, fish, stuffing, barbecue	cough, gallbladder disease, menstrual pain, headache, irritability, rheumatism, stiff neck, seasickness, toothache, upset stomach
Oswego tea	oil, tea	cold, sore throat, sinus pain
pansy	candy, salad, garnish	congestion, toxins, skin inflammation
papaya	juice, fruit wrap, meat tenderizer	back pain, anticoagulant
parsley	salad, garnish, <i>bouquet garni</i> , sandwich, soup, fried fish, eggs	acne, dandruff, dry hair, dry skin, halitosis
pepper, black	condiment, oil, flavoring	flatulence, heart pain, kidney disease, infection
pepper, chili	flavoring, salad, pickles	bursitis, rheumatism, infection, poor circulation
periwinkle	tea	cancer, stings, eye pain, congestion, sore throat
pine nut	snack, thickener	bronchitis, eczema, constipation, enteritis
pineapple	fruit, beverage, tenderizer	skin inflammation, abscess, ulcer, anticoagulant
pipsissewa	root beer, candy	kidney stone, sore eyes, leg swelling, rheumatism, infection
poppy	bread, cake, biscuit, soup, oil, garnish, condiment, food dye, wine, pastry	cough, enteritis, pain, insomnia
prickly lettuce	salad, vegetable	poor lactation, chapped skin, kidney disease
numkin	vegetable, oil, snack, pie,	worms. burn. urinary pain

fruit butter	fruit butter	edema, poor appetite
purslane	salad, vegetable, soup, pickles, flavoring	edema, poor appetite
pussytoes	chewing gum	cough, fever, skin irritation
quassia	dessert	malaise, liver disease, gall bladder pain, leukemia
raspberry	syrup, tea, fruit, jam, jelly	spasm, plaque on teeth, heart disease, childbirth pain, cramp, cold, fever, enteritis, skin irritation
rose	pickles, pie, salad, garnish, liqueur, wine, tea, syrup, jam, sauce	conjunctivitis, poor circulation, tension
rosemary	roast meat, game, pâté, bread, vinegar, orange, sausage, herb, oil, potato	asthma, chill, dandruff, gout, rheumatism, indigestion, infection, soreness, baldness, malaise, oily hair, toothache, poor circulation
rue	milk, cheese, marinade, eggs, fish, sauce	diabetes, edema, epilepsy, worms, spasm, fever, hysteria, wound, poor lactation, rheumatism, skin ulcer, menstrual pain
safflower	cooking oil, food dye	edema, hypertension, skin disease, fever, constipation
saffron	food coloring, curry, cake	Alzheimer's disease, tumor, depression, breast cancer, antihistamine, immunity
sage	cheese, dip, soup, vinegar, bread, biscuit, omelette, vegetable, tea, beer, herb	dirty pores, dry hair, fever, sweating, tension, sore throat, menstrual pain, dysentery, halitosis, poor lactation, colic
sagebrush	liqueur	enteritis, flatulence, sores, bullet wound
Saint-John's-wort	salad, tea	anemia, bruise, headache, insomnia, pain, ulcer, rheumatism, tension, varicose veins, wound, tuberculosis, depression
sassafras	tea, oil, syrup, root beer	malaise, blood disease, syphilis

scurvy grass	herb, salad, potherb	scurvy, gout, rheumatism, kidney stone, acne
sea holly	vegetable	cystitis, malaise, prostatitis, sexual dysfunction, urethritis, wound
sea onion	stock, vinegar	congestion, cough, kidney problems, heart disease, poison
seneca snakeroot	syrup, tea, candy	pleurisy, cough, cold, asthma, infection
sesame	snack food, bread, oil, vegetable, casserole, sauce, pâté, biscuit	constipation, hemorrhoids
shepherd's purse	vegetable, salad, stew, herb	bleeding, hemorrhoids, skin inflammation
silverweed	vegetable, tuber	cramp, indigestion, sore gums, sore throat, toothache
skirret	stir-fry vegetable, meat, stew, pie, pickles, salad	edema, indigestion, jaundice, urinary disease
slippery elm	tea	kidney disease, childbirth pain, enteritis, skin disease, diphtheria
smallage	salad, cheese, poultry, stuffing, garnish, fish, soup	colic, diabetes, flatulence, indigestion, insomnia, kidney disease, poor appetite, urinary disease
smartweed	seasoning, food coloring	cholera, earache, epilepsy, toothache, skin irritation, contraception
soapwort	garnish, fruit salad, beer, salad	acne, psoriasis
sorrel	sauce, soup, meat, salad, fish, poultry, eggs, flavoring, vegetable, herb	boil, dry skin, fever, kidney disease, liver disease, gout, sunburn, ulcer, wound, constipation
soursop blueberry	fruit, tea	bladder disease, diabetes, worms, skin irritation
speedwell	tea substitute	congestion, skin irritation
spicebush	spice, tea	cold, malaise, worms, dysentery, bruise, rheumatism, menstrual pain
spikenard	root beer, syrup	malaise, rheumatism, gout, deafness,

spicebark	root beer, syrup	sypphilis, earache, broken bone, angina
summer savory	beans, sauce, roast meat, soup, vinegar, beverage	indigestion, nausea
sundew	syrup	cough, spasm, tuberculosis
sunflower	snack food, oil, salad, sandwich, vegetable	cough, kidney disease
sweet cicely	stew, fruit, jam, salad, cake, pudding, fruit salad, stir-fry, dressing, sweetener	indigestion, inflammation, poor appetite
sweet flag	candy	cramp, flatulence, malaise, fever, toothache
sweet herb	sweetener, potherb	diabetes
sweet woodruff	beverage, wine, cordial, herb	stomach pain, tension, poison, wound
sweetgum	flavoring	congestion, infection, ringworm, herpes, acne, hemorrhoids
tansy	stew, flavoring, sausage, meat, pie, omelette, food coloring, stuffing	bruise, sprain, rheumatism, menstrual pain, cold, stomachache, spasm
tarragon	fines herbes, sauce, soup, fish, vegetable, eggs, roast chicken, grilled meat	indigestion, poor appetite, menstrual pain, scurvy, toothache, malaise
thistle	vegetable, oil, salad, tea	cancer, rhinitis, skin ulcer, fever, liver disease, contraception
thyme	<i>bouquet garni</i> , meat, fish, game, meat, vegetable, fruit salad, jam, oil	arthritis, chill, dandruff, hay fever, indigestion, infection, malaise, poor appetite, nightmares, sore throat, athlete's foot, enteritis
trefoil	tea	nerves, spasm
turmeric	pickles, mustard, food dye	bruise, gas, worms, skin lesion, infection, liver disease, arthritis
valerian	soup, stew	cramp, exhaustion, headache, insomnia, tension
wormwood	liqueur, stew	bruise, exhaustion, fever, liver

vervain	liqueur, stew	disease, sore throat, urinary infection
violet	garnish, candy, cake, food dye, ice cream, salad, syrup, pudding, punch	bruise, constipation, cough, pleurisy, jaundice, headache, insomnia, stress, epilepsy, skin cancer, kidney disease
water lily	stir-fry vegetable, boiled tuber	enteritis, skin irritation, excessive libido
watercress	salad, soup, sandwich, garnish	scurvy, malaise, cough, asthma, acne, contraception
white oak	nut, tea	sores, wound, skin irritation, hemorrhoids
wild cherry	syrup, jam, jelly, wine, gin	enteritis, lung inflammation, worms, ulcer, abscess
wild ginger	candy, flavoring	menstrual pain, flatulence, malaise, fever
wild licorice	sugar substitute, candy	pain, earache, fever, ulcer, rheumatism, cough, childbirth pain, arthritis
wild strawberry	meat, gravy, fruit, jam, candy, cake, pie, syrup, cordial, liqueur, tea	anemia, enteritis, edema, poor appetite, fainting, fever, gout, kidney disease
willow	mashed vegetable	pain, nausea, cold, fever, insomnia, indigestion, inflammation
winter savory	vegetable, jelly, herb, flavoring	fever, flatulence, indigestion, pain, sore throat, stings
wintergreen	beverage, tea, candy	headache, infection, pain, rheumatism, sore throat, skin disease, inflammation
witch hazel	snack seed, oil	strain, fever, bruise, bleeding, menstrual pain, hemorrhoids, eyewash, postpartum soreness, acne
wormwood	liqueur, bitters, wine, beer, food dye, flavoring	gout, malaise, bruise, worms, swelling, menstrual pain
woundwort	tuber, vegetable, pickles	wound, bleeding, vertigo, dysentery
yarrow	tea, spice, food dye	cystitis, flu, hangover, hypertension, infection, oily hair, oily skin, wound, earache

**yellow
bedstraw**

food dye, cheese, beverage

sore feet, bleeding, styptic, kidney
disease, epilepsy

Glossary

aeroponics a soilless horticultural system that encloses plant root systems and supplies nutrients and water through misting; a variant of hydroponics. *See also* hydroponics.

agribusiness the totality of buying and selling involved in bringing food crops to the table, involving farmers and herders along with financiers, equipment manufacturers, seed suppliers, livestock marketers, and food processors and distributors, a system that the United Nations encourages in preindustrial countries.

agroecology the integration of food production into a sustainable whole by allying scientific knowledge of the systems of nature with farming and herding, such as balancing Brazilian livestock pasturage with preservation of the rain forest.

anthropophagy cannibalism; the ingestion of human flesh by their own kind, a food culture once observed by Australian Aborigines and other native peoples.

aperitif a spiritous appetite stimulant served before a meal, such as the herbal bitters drunk in the 1200s to ward off cholera.

apiculture the keeping of bee colonies in apiaries as a source of honey, pollen, and wax, a form of husbandry that the ancient Romans passed to medieval farmers.

appetizer a preface to the eating and digestion of a satisfying meal, such as the *mezes* that Arabs serve before a heavy dinner.

aquaponics a sustainable food production system that applies a simulated habitat to the controlled growth of fish and plants, a food business in Japan.

asceticism self-denial of luxury beverages and foods as well as normal comforts,

a monastic self-discipline that trained Christians in stoicism.

bain-marie a version of the double boiler that heats delicate custards and egg dishes to a fixed temperature over boiling water without drying out ingredients, the invention of Florentine alchemist Maria de' Cleofa in the early 1500s. Catherine de' Médici brought the device to France on September 2, 1533, as part of her trousseau.

barbecue the slow-cooking of meat over a smoky fire, a culinary technology invented by the Caribbean Arawak, Carib, and Taíno peoples.

biopiracy the theft and control of indigenous fungi, livestock, plants, and seeds for commercial exploitation, notably food plants from Africa for sale by industrialized nations.

bottarga mullet roe, a Byzantine forerunner of caviar, which the Egyptians called *batarekh*.

bouquet garni a string-tied bundle of bay leaf, parsley, and thyme, three essential herbs that Pierre La Varenne introduced to the cooking stage of soup, stew, and stock. The string enabled the server to remove the bundle before plating the dish.

charcuterie the curing and preservation of fresh pork as bacon, confit, forcemeat, *galantine*, ham, pâté, or terrine, all French specialties. *See also* confit.

colloid a gas, liquid, or solid dispersed within another substance, the physical principle behind homogenized milk. *See also* emulsion.

compressor the device in a refrigerator that reduces refrigerants into hot, high-pressure vapor for lowering temperatures.

confit a meat preserved in salt and cooked in its own fat, such as *confit de canard*, a duck recipe developed by early Louisiana Cajun cooks.

congee a cooked cereal such as rice thinned with broth or milk, a staple of

Chinese cuisine.

coprolite charred, dried, or frozen feces or excrement, which bears evidence of food types and diversity as well as cooking styles. Archaeologists analyze coprolites to determine the foodways and nutrition of prehistoric diners.

cordial a sweet aperitif, tonic, or soft drink that spurs appetite, such as the elderflower beverage distributed to guests in ancient Rome.

coshering the paying of landlords in food-rents of cattle and grain, a feudal economic system between the aristocracy and tenant farmers.

cuisine du pauvre a planned diet for soup kitchens and feeding stations, conceived in 1790 by Count Rumford to relieve the beggars of Munich, Germany.

curd a gel or coagulant of milk; a source of cheese, including tofu, a vegetable cheese derived from soybean curds.

curing the processing of fish and meat by smoking or flavoring with salt and sugar plus nitrates or nitrites to preserve fats and proteins. Charcuterie is the French subspecialty of curing pork.

dairy food products derived from processing the milk of buffalo, camels, cows, goats, horses, sheep, and yak, including koumiss from mare's milk and ewe's milk cheese.

dal a split pulse made from a husked bean, lentil, or pea. Variants of dal recipes identify the cookery of parts of India and Sri Lanka.

debitage the rock fragments, flakes, and shattered or damaged materials of stone tool manufacture, such as chert, flint, or obsidian skinning, flaying, and deboning knives and burins for carving bone and wood eating utensils and bowls.

desalination any process removing salt from water to make available potable water for house hold use and crop irrigation, a boon to utilities in Dubai, Israel, and other arid countries.

deviled an eighteenth-century term for seasoning a dish or ingredient with the hottest mustards and spices, such as deviled lobster, a coastal English specialty flavored with cayenne.

dietetics the study of food consumption and the effects of nutrients on human health, an outgrowth of the U.S. home economics movement of the 1910s and 1920s.

dioxin a toxic chemical compound that threatens human health, particularly breast milk.

Edenic diet a stringent form of veganism that follows the scriptural model in the book of Genesis by excluding all meat and shellfish, salt and spice, sugar, coffee and tea, and alcohol. *See also* veganism.

emulsion a mixture of two incompatible liquids, such as oil and vinegar in vinaigrette and oil and egg in mayonnaise.

endangered species a plant or animal that sinks too low in numbers to survive. The threat of extinction heightens depletion of the world's food diversity, such as the loss of shark, tilapia, and whale from seafood.

endore to gild or glaze the crust of a presentation piece with savory egg yolk and saffron mixtures. In the early Renaissance, chefs extended endoring with real gold leaf and other metallic finishes hardened in lidded tureens or before metal screens.

entomophagy the consumption of insects for food, such as the Aztec consumption of live crickets in tacos and the Chinese sale of scorpions on skewers as street food.

entremets palate cleansers served between courses of banquets, as described in Taillevent's *Le Viandier* (*The Provisioner*, ca. 1375), a sourcebook of medieval cuisine.

epicure an individual whose discriminate taste focuses on fine dining and table

luxuries, the defining characteristic of restaurant critic James Beard.

espaliering spreading shrubs and trees horizontally over a flat plane while inhibiting shoots branching obliquely or vertically, a plant technology that boosted fruit and berry production in Renaissance kitchen gardens.

estate tea an unblended tea picked from a single variety of bushes grown in a distinct terroir, such as Prince of Wales tea, a favorite of Edward VIII.

Eucharist a Christian sacrament involving ritual consumption of bread and wine, commemorations of the body and blood of the martyred Christ. The medieval elevation of the sacrament dignified the professions of bakers and vintners.

factor a dealer or commercial agent of a stock corporation, such as the Hudson's Bay Company or the Dutch East India Company.

fermentation a chemical phenomenon that converts carbohydrates into acids or alcohols, a source of flavor and texture in Inuit buried salmon.

fertigation the injection of soluble fertilizer directly into an irrigation system, a method that applies nutrients to an aquaponics garden such as those in Barbados and Australia.

filtre a love potion or tonic, a focus of ancient literature, such as the myth of Tristan and Isolde, who mistakenly drink a charmed wine intended for King Mark.

food justice the opposition to patent abuse that strips smallholders of food sovereignty, such as the planting of hybrid corn in Angola.

food sovereignty the human right to produce food through farming, fishing, and herding, a liberty promised to Indian tribes in the Northwest.

foodie neologism for a food hobbyist, such as the gourmands who form exotic food clubs.

forcemeat a puree of ground meat emulsified with fat as found in pâté and

sausage, a preservation method pioneered by German butchers.

four humors an ancient Greek scientific term for blood, phlegm, black bile, and yellow bile, the extremes of human chemistry that cooks sought to balance with specific food combinations.

fricassee a juicy dish of meat or poultry sliced into chunks and stewed in gravy or pan drippings, a favorite in ancient Persia.

frugivore a fructarian or fruit eater, such as the early hominoids, who subsisted on fruit and nuts.

gastronome an intellectual who studies the sensual elements of nourishment, an interest of Greek and Persian sybarites.

gene bank the protected storage of genetic resources, such as the collected seeds and plant material of Seed Savers Exchange near Decorah, Iowa.

genetically modified food the integral modification of ova or seeds through recombinant DNA technology, a reordering of the essential material that establishes the uniqueness of a plant or animal, such as corn, rice, or sheep.

germplasm a collection of genetic resources for an organism, such as food plants cataloged and distributed by the Royal Botanic Gardens Millennium Seed Bank.

gourmand an individual who takes pleasure in eating and drinking, a description of the courtiers of Henry VIII.

gourmet an expert on the best in food and drink, such as Julia Child, a proponent of French cuisine.

Green Revolution post—World War II scientific initiatives— notably the work of Norman Borlaug—that boosted the world's agrarian yield. *See also* genetically modified food.

groats hulled whole barley, buckwheat, oats, or cracked wheat, an ingredient in tabbouleh, a Middle Eastern salad of grains, mint, and parsley.

halal a term for food deemed permissible and fit for consumption under Islamic law.

heritage foods an authentic regimen of cooking and eating for a particular population or culture, such as the Aleut of Alaska.

hippocras heated wine spiced with cinnamon, a common nightcap during the Middle Ages.

hippophagy the consumption of horse meat, which eighth-century popes forbade as a form of idolatry in pagan Germans.

hybridization the crossbreeding, mating, or interbreeding of living things to produce dissimilar offspring or stock. Through hybridization, California agronomist Luther Burbank pioneered 800 innovations in truck farming and orchardry to increase the supply and quality of the world's food.

hydroponics the cultivation of plants in water, a source of pesticide-free organic produce such as that pioneered aboard the space station.

idiocuisine food containing the ingredients and recipes indigenous to a household, such as the unique recipes and canning of English apple growers.

insectivory *See* entomophagy.

intraspecific within a single species, such as hybrids of the wild blueberry.

irrigation the artificial watering of soil and vegetation to increase the success of dryland farming and areas incurring inadequate rainfall, such as sub-Saharan Africa.

kosher the detailed regimens for food selection and cleanliness dictated by *kashruth*, Torah dietary law, particularly the avoidance of swine and pork products.

leaven an ingredient mixed into bread dough that ferments or releases CO₂ bubbles to create a light texture, such as compressed yeast and baking powder in

Southern angel biscuits.

libation a sacred beverage poured on an altar to reverence a deity, the task of male house holders in ancient Rome.

linctus a homemade cough syrup made by blending herbs and root extracts into sugar syrup.

liquidarianism a fruit diet that excludes pulp and seeds and relies solely on alternating fasting with fruit juices hydrorianism.

local food movement a grassroots encouragement of consumers to subsist on area harvests of flora and fauna within a 100-mile (160-kilometer) area, a campaign that flourishes in Australia's outback and shores.

locavore a consumer of locally grown produce, including the fish and vegetables raised on aquaponic farms.

macrobiotics a diet that stresses whole grains and limits consumption of avocados, beets, eggplant, peppers, potatoes, spinach, tomatoes, seafood, and other animal products. *See also* veganism.

Maillard reaction a chemical change in browned foods producing identifiable flavors, including bread crust, fried steak, and roux, a Creole cooking staple of fried flour that enriches gravies and stews.

mandoline a kitchen device that slices, crinkle-cuts, and juliennes fruits and vegetables.

mano and metate a stone tray and cylindrical crushing bar used by North American peoples to pulverize seeds, grains, and manioc roots to make flour, such as corn for *pulque* or tacos.

mezzaluna a single or double semicircular blade rocked back and forth for dicing herbs or cutting blubber, the favorite meat of Eskimos.

mocuck a lidded bark storage box used by forest Indians to store nuts and tubers.

moulinette a French food mill for pureeing vegetables, as described in Elizabeth David's *French Country Cooking* (1951).

mouthfeel the chemical and physical element of chewing solids and swallowing liquids. Effects involve difficulty of mastication, viscosity, moisture, density, and aftertaste. Russian cooks refine the mouthfeel of meat pies by cooking them in beef broth.

national dish a food that characterizes a nation and its foodways and illustrates the ingenuity of an ethnic group in readying local ingredients for the table, such as passion fruit drinks in Costa Rica and *poi* in Hawaii.

nutriceutical an edible that combines the benefits of nutrition and prevention of disease, such as freeze-dried lactobacillus and fish oil capsules.

omnivore animal species that eat animals and plants, a description of early hominids.

open pollination the propagation of a plant by insects or wind rather than human intervention, the Aztec method of corn production.

organic foods edibles near their original form that come to market in a pure state without additives, dyes, fertilizer, genetic modification, irradiation, and pesticides, including leaf greens and farm-raised catfish.

orthorexia an eating disorder in people obsessed with health food regimens, such as fasting, liquid diets, and raw foodism. *See also* raw foodism.

osmazome the flavor of roasted meat, which Japanese biochemists identify as *umami*. *See also* *umami*.

parfleche a rawhide food bag in which Amerindians packed travel foods, such as dried berries, jerky, and pemmican.

pastillage the creation of figures, symbols, and scenes from sugar dough and gum-based paste, the artistic medium of Nicolò della Pigna, a sixteenth-century

pastry chef.

patent an official monopoly of trade over other competitors, such as the legal control that Monsanto places over genetically engineered seed.

pathogen any microorganism that can cause disease in a plant or animal, such as coffee rust, peach leaf curl, or gray mold on squash.

PCBs (polychlorinated biphenyls) toxic organic compounds that endanger the human endocrine and nervous systems.

permaculture the creation of permanent landscaping with berry bushes and fruit and nut trees, a sound ecological investment providing food security.

pisciculture the raising of fresh water fish in farm ponds, a common source of protein at monasteries during the Middle Ages. *See also* aquaponics.

pome fruit tree fruit with a fleshy mesocarp, notably, the apple and pear, both onetime ingredients in ketchup.

prazo a semifeudal African plantation supervised by Portuguese overseers, such as the estates exploiting native resources of the Zambezi River valley.

rationing the allotment of foods during wars and national emergencies, a method of preventing the hoarding and black marketing that emerged during the Korean War.

raw foodism (or rawism) consumption of only raw foods, primarily beans and grains, fruits and vegetables, juices, nut pastes and seeds, plant oils, sea vegetables, and uncooked meats.

reduction a sauce or stock boiled down to the consistency of gravy, such as raspberry dressing for chocolate mousse, a standard dessert in nouvelle cuisine.

rococo an extreme of decoration that marked banquet centerpieces during the 1700s.

roux a cooking basis blended from flour in hot bacon fat, butter, or olive oil. As a result of the Maillard reaction, a small amount of roux imparts a nutty taste to meat and vegetables. *See also* Maillard reaction.

salmi a highly flavored ragout of roast bird and mushrooms, such as that prepared for the late-eighteenth-century Lapérouse expedition in the South Pacific.

service à la russe the presentation of dinner in separate courses on individual plates rather than in grand rococo displays. In 1856, Felix Urbain Dubois began shifting formal meals away from *service à la Française*, which treated cuisine as a demonstration of wealth and largesse. *See also* rococo.

shaduf a counterweighted dip bucket, an early Egyptian technology that enabled a farmer to maintain an even flow of water in irrigated vegetable beds.

shuttle breeding the cultivation of the same crop at different altitudes and latitudes, such as short-stemmed wheat in the plateaus and piedmont of Mexico and paddy and dryland rice in Cambodia.

sofrito a Latin American and Spanish condiment combining annatto seed, chili pepper, cilantro, garlic, ham, onion, and oregano sautéed in lard. In Puerto Rico, cooks use sofrito as a seasoning for beans and rice.

sutler a freelance itinerant grocer, such as the wagoneers who marketed liquor and luxury foodstuffs to soldiers during the American Civil War.

sybarism indulgence in luxuries and pleasures, a description of the self-indulgent eating style in France under Louis XVI and Marie Antoinette.

synesthesia the merger of sensual delights, particularly aroma and flavor in the consumption of vanilla, an early ingredient in hot chocolate.

tagine a Berber pot fashioned from clay into a saucer and cone-topped lid, a source of liquid condensation that tenderizes mutton and lamb.

tartare mammal meat or fish chopped raw for service on rusks, such as Sicilian carpaccio or Peruvian ceviche.

terroir the complex influence of geography, climate, and temperature on local foods, particularly monofloral honey and coffee, tea, vanilla, and wine representative of a limited region, such as the volcanic soil of Mexico's Mazatlán Valley and the Chinese provinces that produce estate teas.

umami a fundamental flavor of meat first isolated in Tokyo in 1908 and added to the basic savors of bitter, salty, sour, and sweet. *See also osmazome.*

understory vegetation that grows under the forest canopy, a source of mushrooms, truffles, and fiddlehead ferns.

veganism the avoidance of animal products through a diet of fruits, nuts, and vegetables.

vegetarianism the avoidance of crustaceans, fish, domesticated animals, game, poultry, and shellfish in the diet. Extreme vegetarians also abstain from meat by-products including gelatin and rennet, a curdling element employed in cheese making.

vermifuge a purgative substance that rids the body of intestinal parasites, such as tansy, clove, and artemisia.

zoonosis a disease that can pass between animals and humans, such as Ebola, which humans can contract from handling or eating primate bushmeat.

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